The Inventive Age
AND INDUSTRIAL REVIEW.
A JOURNAL OF MANUFACTURING INDUSTRY AND SCIENTIFIC PROGRESS.

Sixth Year. No. 1. | WASHINGTON, D. C., JANUARY, 1895. | Single Copies 10 Cents. $1 Per Year.

LAUNCHING OF A GREAT STEAMSHIP.

The Most Delicate and Responsible Part of the Ship Builder's Work.

The vast amount of material used, labor expended and money invested in building one of our modern ocean "Greyhounds," is of so much interest that the launching of a monster steamship is now attended with more consideration and concern than heretofore. With the building, dimensions, speed and elegance of the great steamships the average reader becomes fairly well acquainted through the medium of articles appearing in the daily press, and more technical matter published by marine and scientific journals, but of the actual launching—the *modus operandi* of this important proceeding—the knowledge of the "land lubber" is very superficial.

The cut presented herewith is an illustration of the new liner "St. Louis" as she appeared on the ways of her builders, the William Cramp & Sons, Philadelphia, on the morning of November 12th last. This cut was made especially for THE INVENTIVE AGE from a photograph, by Wm. Rau, photographer, Philadelphia. The fact of this vessel being the largest ever launched, the participation of the President and Mrs. Cleveland and several Cabinet members in the ceremonies, the cleverness of the photographer and lithographer in producing such a life-like likeness of the event, combine to make the selection of the "St. Louis" a happy one to illustrate the launching of a great vessel.

LAUNCHING OF A GREAT STEAMSHIP—THE "ST. LOUIS" AS SHE APPEARED ON THE WAYS.
(From Copyrighted Photograph by Wm. H. Rau, Philadelphia, Pa., 1894.)

A ship is built by numerous heavy shores or props. Before launching she must be lifted from her keel blocks and the shores removed so that an entirely new system of support from the original support is built, which consists of the launching ways. The launching ways consist of the ground ways and the bilge or sliding ways. The ground ways are fixed tracks laid on piling and blocks, on each side of the vessel, extending well down in the water.

On these other ways, called the sliding ways, are laid tallow and oil, being put between, so that the upper ways can slide easily along the ground ways into the water. From the sliding to the bottom of the vessel packing of wood is fitted, carrying the ground ways up to the bottom. When the wedges are driven in between the sliding ways and the packing, it is easily understood that she will be lifted up and supported on the two ways which are about one-third the width of the vessel. Now, if the keel blocks and shores are removed, we have the vessel supported entirely by the launching ways. The upper ends of the sliding ways are carried out to a thickness of about four inches and this is bolted through to the ground ways. This is what holds the vessel and as soon as it is sawed off she slides into the water.

Nearly all vessels are built with stern nearest the water, very few, except river craft, being launched sidewise. Low tide time is usually selected, and for large vessels the slope of the "ways" is a little less than an inch to the foot.

Launching is always the most delicate part of the ship builder's work. It involves the greatest responsibility concentrated in the shortest time, and with little or no opportunity to avert the consequences or retrieve the results of any serious errors, and naturally this responsibility is agumented in a highly progressive ratio by the size and cost of the vessel to be "put overboard," as the launching is usually termed in the parlance of the ship yard.

Many things may happen to disturb the symmetry of a launch. If the weather is extremely cold, the tallow between the ways may not act properly and it may be necessary to force her off by hydraulic jacks.

There have been instances in England where a vessel was launched with a number of people on board, partly capsized because of neglect to provide proper ballast, causing great loss of life. In view of such possibilities the crowning moments of a ship builder's career are those, when by reason of the perfect adjustment of every mechanical appliance, accurate calculation of every mathematical factor and perfect execution of every manual detail, a colossal ship glides noise-

(*Continued on page 4.*)

The Inventive Age

Established 1889.

INVENTIVE AGE PUBLISHING CO.,

8th and H Sts., Washington, D. C.

ALEX. S. CAPEHART. MARSHALL H. JEWELL.

The INVENTIVE AGE is sent, postage prepaid, to any address in the United States, Canada or Mexico for $1 a year; to any other country, postage prepaid, $1.50. All subscriptions stopped at expiration of term.

Correspondence with inventors, mechanics, manufacturers, scientists and others is invited. The columns of this journal are open for the discussion of such subjects as are of general interest to its readers.

Technical matter is particularly desired. We want practical information from practical men.

Nothing will be published in the editorial columns for pay.

The INVENTIVE AGE is thoroughly independent.

Advertising rates made known on application. Special facilities for furnishing cuts of any patented article together with descriptive article. Business specials 25 cents a line each insertion, 7 words to the line. No advertisement less than 50 cents.

Address all communications to THE INVENTIVE AGE, Washington, D. C.

Entered at the Postoffice in Washington as second-class matter.

WASHINGTON, D. C., JANUARY, 1895.

SPECIAL NOTICE.

The February number of THE INVENTIVE AGE will contain the proceedings of the annual meeting of the American Association of Inventors and Manufacturers. It will also contain interesting biographical sketches of many of the leading business and professional men comprising this organization. In this work we ask the hearty co-operation of all members.

NEW FOUNDLAND is just now experiencing a financial panic, the like of which is unknown in the history of that province. Many of the strongest banks and merchantile firms in St. Johns have gone under.

THE census figures show that in 1890 one-third of the people of the United States were of foreign parentage, which emphasizes the fact that the doors of this nation have been opened wide to the "oppressed of all nations." The anarchistic tendency of thousands who have been welcomed to shelter in the "home of the free," furnishes an argument, however, in favor of exceedingly more stringent immigration laws.

IT is a source of considerable gratification to the management of the INVENTIVE AGE to note the attacks that are being made upon it by the effervescent patent shark and fakir. During the past few weeks we have received several anonymous communications that are amusing in the extreme and only confirms the fact that THE AGE is doing a good work along these lines. It also exemplifies the old and trite saying, "step on a worm and he will surely squirm."

THE securing of the contract by the Bethlehem Iron Company, for furnishing the armor for Russia's two new war vessels means a full year's work in the armor department of that great institution. The contract for the Sebastopal and Petropavlovsk calls for over 1,200 tons of armor. The securing of this contract by the Bethlehem people over fourteen competitors, including Krupp, the great German gun maker, is a marked compliment to American enterprise, encouraged and developed by a protective American policy.

THE Trade Mark Record recently issued a circular to a selected list of gentlemen asking them to kindly answer what, in their opinion, was the "best trade mark for a man to adopt for his guidance in this life." Varied and interesting were the replies. Two ministers suggested "Fear God and Keep His Commandments" while another suggested a briefer motto "Aim High." A theatrical manager suggested "Keep Mum," and Chauncey M. Depew, with characteristic bluntness, recommended the following: "Keep your eye on the gun and look out for the main chance."

THE proposition to build a memorial bridge across the Potomac river, connecting Washington city proper with the great Arlington estate and national cemetery, is again before Congress. It is hoped this matter will be given the serious consideration its importance merits. Such a structure is needed and that it should be a magnificent piece of engineering—a monument to the genius of the present day—goes without argument. Let us have a grand memorial bridge, the equal of any the world has ever seen.

SINCE the present management took charge of the INVENTIVE AGE, one year ago, there has never been such an increase in subscribers as during the last month. This is not only a sign of returning prosperity throughout the country, but it is an indication of a widespread appreciation of this magazine among inventors, manufacturers, patent solicitors and others. With this issue the AGE enters upon its sixth year and we believe we are justified in claiming that no other technical magazine ever achieved greater success in shorter time. Divorced from all its former conditions it has, during the past year, demonstrated its thorough independence on all subjects and its unequivocal friendship for the American inventor. It promises no less and no more for the future. Its scope will be enlarged and new features will be added calculated to extend the magazine's usefulness and increase the interest of its readers.

IN a carefully and elaborately prepared pamphlet of over 130 pages, Mr. W. K. Tubman, owner of certain patents on construction of railway cars, petitions Congress to direct the enforcement of the Sherman anti-trust law. The most interesting feature in this somewhat remarkable petition is the declaration of the existence of an association composed of all the leading railroads of the Atlantic States and known as the Eastern Railroad Association. While the claim is made that this organization has been effected for the purpose of mutual protection of railroads against iniquitous patent laws. Mr. Tubman, after a perusal of its constitution and by-laws is of an entirely different opinion. The petitioner in this case, does not hesitate to charge that the chief purpose of this railway association is to disregard the rights of the American inventors and apply the results of their genius to their own benefit without just remuneration. It is said the president of this railroad association receives the handsome sum of $10,000 a year and that in the employ of the association is the best legal talent obtainable. The main object of the association, as expressed by the president himself in his twelfth annual report, is "the protection of its members against unjust claims made for patented inventions," and further to act as a unit in contesting all claims. Another "main object" of the association is said to be the protection of its members against extortion on the part of inventors and where, in the judgment of the committee, taking into consideration the circumstances, influence and ability of the owner of any invention, it is more economical to infringe the patent and contest the inventor than to purchase or lease the same, then litigation follows. Of course Mr. Tubman presents the case of an interested and prejudiced mind, and possibly is not justified in making such a sweeping charge as to declare that "this committee, without lawful intervention, conduct and illegally maintain suits; repeatedly manufacture evidence to cheat owners of Letters Patent; prolong litigation; exercise an undue influence over the bench; and practice other chicanery for the purpose of bringing about a miscarriage of justice in the courts." The petition in question covers 133 pages and seems to have been prepared with a thoroughness equalled only by the earnestness of the petitioner.

THE death is announced at the age of 95, of Mr. Robert Davidson, of Aberdeen, Scotland. He is credited with having constructed a storage battery locomotive as long ago as 1839, which was tested on the Edinburgh and Glasgow Railway.

Valueless References.

The greatest frauds in the patent selling business are frequently those who give the greatest number of references and so far as the inventor is concerned, the usual references given by patent brokers are of no value whatever. And as for ratings by commercial agencies, like Dun and Bradstreet's, they are absolutely worthless. Financial responsibility is no bar to fraud. A man may occupy palatial offices, he may pay his rent promptly, he may have a fat bank account and he may be quoted as responsible for many thousands, by commercial agencies—still he may be dishonest and obtain his money from innocent inventors through dishonest and fraudulent representations. The bank cashier who is given as reference, may write that "so far as he knows" the agent is all right, and that all business with the bank has always been satisfactory; the owner of the building in which his offices are located may write that the agent is prompt in his rent and "so far as he knows" is entirely responsible and trustworthy; the commercial agencies may have the patent broker rated as responsible and credit good, and all right "so far as they know;" the mayor, judge and scores of prominent men will answer, in response to the query of the anxious inventor, that the broker stands well, and "so far as they know" is perfectly reliable—yet, nothwithstanding all these endorsements the broker may be a fraud and the enemy of the inventor.

One correspondent, who has bought his experience writes the AGE as follows: "I find that in this business a man may stand high in his own locality and yet be a regular shark in his dealings with those at a distance. All rules employed by merchantile men for investigating parties are useless when applied to patent brokers." This is very true. The calcium light of investigation is not very penetrative, when applied by one whose name is given for "reference." And even with all the zeal of the United States postoffice inspectors, there is not a mail but that is laden with thousands of fraudulent letters—not a day but that the postoffice privileges are abused and the mails used for dishonest purposes by patent sharks and other scoundrels. How many inventors have been hoodwinked by references. To use an expression of the prize ring, how many inventors have been "put to sleep" and had all suspicions allayed by the cleverly worded circulars and "dictated" letters sent out by alleged patent agents. How many inventors have been bewildered by visions of riches and fame after reading that line worded about as follows in many of the propositions: "No honest broker can say exactly what your patent is worth but, in offering it for sale I should place the value very high, say about $70,000, so as to get the highest possible price." And how many inventors have been captivated by those bond-like contracts—fine specimens of the engraver's art—in which it is held out that by simply signing and returning one of them, accompanied by $20 "towards advertising," etc., the inventor will have succeeded in securing the powerful influence of the said patent agency with all its high priced agents and connections in this country and all foreign lands. Some agents insert a paragraph setting forth some large sales made "in the last few days," but when the skeptical inventor writes to them for names and dates how they do squirm. Some agents are shrewd enough to understand that over-inquisitiveness will not be well for their business so they insert a line saying that "if the inventor cannot give them the sale of their patents on the terms mentioned" then they "need not answer the letter" for "the terms cannot be altered in any particular nor under any consideration."

What a picnic these patent sharks were having before THE INVENTIVE AGE got after them, and while they are now more cautious they are still doing business at the old stand; and as our Australian correspondent says, they will continue to do business until thoroughly legitimate patent selling agencies establish themselves. There is a splendid field for capital and energy to engage in the development and promotion of inventions and the profession or business of patent selling ought to be as

legitimate as selling machinery or merchandise. The opportunity to obtain immediate returns by fleecing the inventor through fraudulent representations is a temptation that seems almost irresistable, however, and honest patent sellers are almost as scarce as white blackbirds.

NEWS AND NOTES.

Great Lead Deposit.—By the uprooting of a large tree during a recent storm in Washington county, Missouri, a heavy lead deposit was disclosed. Over 400,000 pounds have already been taken from the mine.

* * *

Fire Proof Paper.—Paper indestructible by fire has been invented by M. Meyer, of Paris. A specimen of it was subjected to a severe test—148 hours in a potter's furnace—and came out with its glaze almost perfect.

* * *

The Secret of Annealing Brick.—The secret is that no cold air is allowed to enter the kiln. The cooling is done with hot air. This seems rather a paradox, but it is the only way, and by this means you temper your brick like steel is tempered or like glass is annealed and if you have the right kind of kiln and use it properly, there should be no variation in your product. The difference between a good and bad paving brick is often merely a question of annealing.

* * *

The New Bridge Over the Deleware River.—The approach on the Pennsylvania side will begin at Frankford Junction on the New York division of the Pennsylvania Railroad, and will connect with the Camden and Amboy Railroad at Fish House Station on the New Jersey side. The bridge will be 1950 feet in length, and will have a double track line of railroad, to be built at a clear height of 50 feet above high water. The width will be 34 feet over all. It will be constructed of steel and will be supported by six piers of masonry, rising 50 feet above the water. The bridge will have three fixed spans 540 feet in length and a draw span of 330 feet over all, providing for two clear openings of 125 feet each at the channel of the river. The piers under the fixed spans will be built of granite, 67 feet long and 21 feet wide, standing 45 feet in height above high water. The approach of the bridge on the Pennsylvania side of the river will be 2 miles in length and on the New Jersey side ½ mile in length.

* * *

Resuscitation of Electrocuted Persons.—The question of resuscitation from death by electricity has called out an interesting discussion in the newspapers throughout the country and more especially in New York state. Among its champions are some of the most noted electricians and physicians of the day. Dr. P. J. Gibbons, of Syracuse, N. Y., recently applied to Gov. Flower for permission to use his device for that purpose on murderer Wilson, which, under advice of the Attorney General of the state, was denied. Dr. Gibbon's apparatus consists of a pair of hand bellows whose handles are connected together. At the mouth of each bellows is fastened a flexible tube and these two tubes are connected by a Y junction terminating in a single tube. The end of the tube is inserted in the mouth of the patient, or, if this be closed, in an opening made in the throat. The patient's nose is closed and when the handle of the bellows is raised the air rushes from the patient's lungs into one apartment of the bellows. Simultaneously the other apartment is filled with fresh air through a tube on the reverse side. This air is forced into the lungs by the compression of the handles.

The Gordon Disappearing Gun Carriage.

The Gordon disappearing gun carriage for a 10-inch rifle was tested for time and rapidity on December 3, at the Sandy Hook proving ground, in the presence of the Assistant Secretary of War, the Ordnance Board officials and representatives of the builders, the Morgan Engineering Company of Alliance, Ohio. Thirty-two shots were fired within an hour, and the trial was regarded as an entire success. This carriage is slightly different in its equipment from the one tested some time ago. It is worked by electric motors, one for the air compressor and one for moving the carriage. The total weight of the carriage is 325 tons, while the gun weighs 27 tons. The contract price was $48,000, and according to the terms ten shots were to be fired in an hour, with a bonus of $2,000 for each additional shot fired. This performance, therefore, secures to the builders a bonus of $44,000.

The Great Tower Bridge, London.

In June last was completed another engineering triumph—the Tower Bridge over the Thames river, London. The cost in round figures was $4,100,000. It stands as an enduring and beautiful monument to its engineer and designer, Mr. Wolf Barry, and was erected in exactly six years time. The illustration presented herewith, through the courtesy of the National Builder, Chicago, is faulty in one respect, in that it plainly shows but one passage way across the bridge. There are two. The photograph, from which this cut was made, was taken when the "leaves" forming the lower footbridge were raised to admit of the unrestricted passage of ocean vessels.

THE GREAT TOWER BRIDGE, LONDON.

These immense "leaves" are hoisted quickly and smoothly by hydraulic means, a 360 horse power steam plant being required. These "leaves" weigh 1,000 tons, and the time occupied for opening or closing is only two minutes. When the lower passage way is raised the foot passengers have access to immense elevators located in each tower, and are elevated to the upper footway, 140 feet above the water. Thus foot passengers need experience no delay while commerce demands attention. The opening of the bridge on June 30th last was made the occasion of a general jubilee in London.

New Rotary Steam Engine.

Mr. Jonas A. Johnson, of Holmes city, Minn., is the inventor of a new rotary steam engine for which

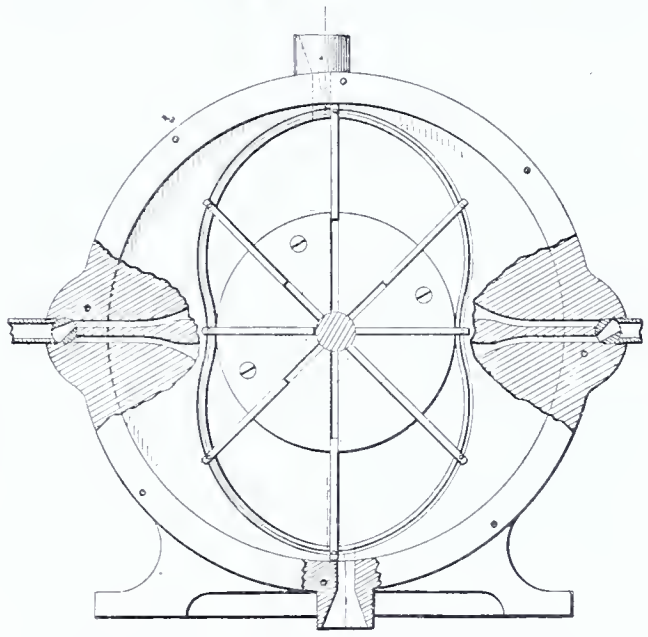


Fig. 1.

he claims both novelty and merit. It is very simple in construction, durable and economical to run. The inventor writes as follows regarding it:

"The simplicity of construction is seen in the way the pistons move in and out between the two plates and into the central drum, by the two pins in the end of the pistons fitted into the groove of the cam in the central ring of the engine, also in the way the controlling valves of the inlet parts work. By turning them ¼ revolution the engine is reversed to run in opposite direction. By turning the valves a little more in the same direction the steam is cut off entirely. Why it can do as much work or more with less steam pressure than under other constructions is because the space for the steam between the central drum and the web of the central ring is so shaped that when the pistons pass the inlet port the steam is cut off and remains between two pistons to expand until the piston in advance reaches the exhaust port. While the steam thus expands it acts on that piston forward, while at the same time live steam is acting on the other of the two pistons enclosing the expanding steam. As there are two inlet ports, steam is acting on four pistons at the same time, the expanding steam acting against two pistons and live steam against two other pistons.

As far as known there has not been any engine constructed before where the steam is used to such an advantage. When the steam is turned on the pistons attend to the cutting off of the steam inside the engine without checking in any way the steady flow of the steam in the feed pipe. The motion of the engine is not in any way checked by the atmospheric pressure when the steam escapes through the exhaust port, but rather assists in pressing it forward. Therefore the motion of the engine is smooth and steady. The balance wheel is done away with.

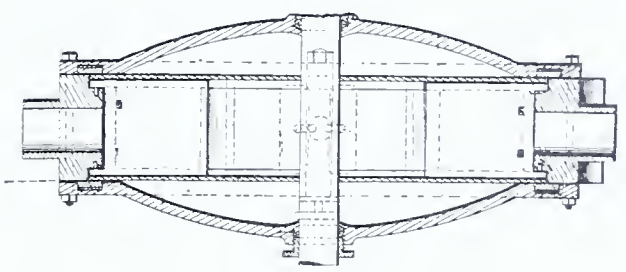


Fig. 2.

Even the main shafting in shops where there are several machines running can be done away with and in its place a main steam pipe may be run through the shop and similar feed pipes connected to it and a little rotary engine placed at each machine to which a feed pipe may be connected. This engine can be used to great advantage wherever steam power is wanted.

Figure 1 in illustration is a side elevation of the engine with one of the cylinder heads removed and parts in section; Fig. 2 is a vertical cross section.

INVENTORS who receive propositions from patent brokers and schemers can assist us in our work of exposing humbugs if they will forward such documents and correspondence to the INVENTIVE AGE.

THE names of fifty-three celebrated sons of Massachusetts are to be inscribed around the dome of the new chamber of the House of Representatives. Among them are Morse, Franklin and Bell.

OPPOSITION TO INVENTION.

Some of the Benefits of Our Protective Patent Law System.

It is pleasant to spell out the name of your invaluable paper, as well as highly gratifying to notice your timely warnings to inventors, manufacturers and the descerning portion of the people of our advancing country, against the attempts of some to abolish the laws which promote invention and reward inventors for the fruits of their brain, by appealing to the prejudices of the uninformed; such appeals being by aspiring, boisterous and unlearned politicians, who seek to gain position by encouraging the errors of the laboring masses in the machine shop, factory, and on the farm.

Why there should be opposition to invention and to our Patent System, cannot be fathomed by the intelligent, and well-informed, when the grand results of invention and benificent purposes of the patent laws are considered.

The question has been asked and answered by a learned man, substantially as follows:

"Should not the authors of most useful discoveries, inventions and improvements in the arts meet with both that fame and profit that their benefactions to mankind entitle them? Surely they should. The world is indebted not only for the comforts, ornaments and luxuries of life, but even for those necessaries, the want of which would consign the human race to the wilderness to become hordes of wanering, naked and houseless savages, much more miserable than the brute creation. While it is to be deplored that the uneducated laboring classes should entertain unreasonable predjudices against invention, and those who introduce into the factories and shops the wonderful product of the brains of men of genius for doing the drudgery work that mankind had previously to do, it is still more deplorable to find men in and out of our legislative halls, and here and there judges of the law, showing unappreciative and hostile feelings toward useful inventions, and the protection to inventors afforded by our benificent patent laws, enacted under the constitution of our country with the express object in view of encouraging and protecting authors and inventors for a limited period, in the fruits of their labor and ingenuity.

Next to a conviction of the moral and political importance of domestic trade, the best means of improving it should engage our attention. There is certainly no department of public service more useful than the patronage of the mechanical ingenuity, by whose inventions and improvements the necessity for animal labor is diminished. No prejudice can be more absurd and mischievous, than that which has frequently objected to improvements in mechanism, on the ground of their tendency to abridge the employment of the more laborious part of society. Among the principal advantages, resulting from the civil association of mankind, we may surely class the opportunity afforded individuals of dedicating their talents to the benefit of the public. and the power of the latter to bestow adequate remuneration for the time and ability so employed. In return for such disbursements from the common stock, the personal convenience and profit of every member of the community are more than proportionately increased. A solicitude to reduce animal labor, within moderate and reasonable limits, is not merely rcommended on the score of political economy, but as one of the most amiable features of civilization; multitudes of our fellow creatures are thereby rescued from the deplorable ignorance, that generally accompanies the lot of manual drudgery, and being thus advanced a rank higher in the human species, may become eligible to many employments, in which the understanding has a share, and which so greatly abound in a wealthy and civilized country like our own. Every one acquainted with the fact, must be saddened by the deletorious effect, on society and civilization, which arises from the drudgery incident to the manipulations of extensive manufactories, and which may be greatly alleviated, and, in some instances, almost entirely annihilated by labor saving machinery. In the progress of the division ot labor, the employment of the greater part of those who live by labor, and that is the great body of the people, comes to be confined to a few very simple operations; frequently to one or two; and the understandings of the greater part of men are necessarily formed by their ordinary employments. The man, whose whole life is spent in performing a few simple operations, of which the effects are, perhaps, always the same or very nearly the same, has no occasion to exert his understanding, or to exercise his inventive talent in finding out expedients for removing difficulties, which never occur. He naturally loses, therefore, the habit of such exercise, and becomes as stupid and ignorant as it is possible for human creatures to become. The torpor of his mind renders him not only incapable of relishing or bearing a part in any rational conversation, but also of conceiving any generous, noble, or tender sentiment, and consequently of forming any just judgment. Of the great and extensive interests of his country, he is altogether incapable of judging, and unless very particular pains have been taken to render him otherwise, he is equally incapable of defending his country in war.

It has been the strange and infatuated policy of some of the most ancient nations of the eastern world to oppose modern improvements in science and arts, as useless or injurious innovations. Thus their science has gone but little beyond first principles as compared with our own and other countries that encourage invention and have good patent laws. Their arts have been confined to simple processes, and they have stopped in their progress to improvement, at a point very far short of attainable perfection. Americans, it is hoped will not imitate such examples, when they reflect that improvements in the arts, if fostered by that liberal encouragement which true policy dictates, will proceed with an accelerated motion now almost inconceivable. Every improvement opens the door to farther and more important improvements, and every step in one process facilitates further advances, by furnishing new means, instruments and knowledge of intermediate processes, which may lead to results surpassing the anticipations of the most sanguine. The field of invention and discovery is inexhaustible, and the fruits of our researches beyond all price." "Men of genius," says an elegant writer, "are the most productive of all classes of mankind. Their inventions not only fix and realize themselves in some subject, and for some time, but they direct the mode of storing and setting in motion future industry, and instead of perishing in the performance, they are renovated in every renewed action of a similar nature, and endure forever in some permanent habit, regulating the conduct, shortening the labors and multiplying the comforts of mankind."

It should everlastingly be remembered with gratitude, by the inventor, mechanic and the manufacturer, as well as by the consumer—the public generally—that Ex-President Benjamin Harrison, at the Congress of Inventors and Manufacturers, who celebrated with great and creditable success the beginning of the second century of our patent system at the Academy of Music in Washington, D. C., on April 9, 10 and 11, 1891, uttered the following encouraging words:

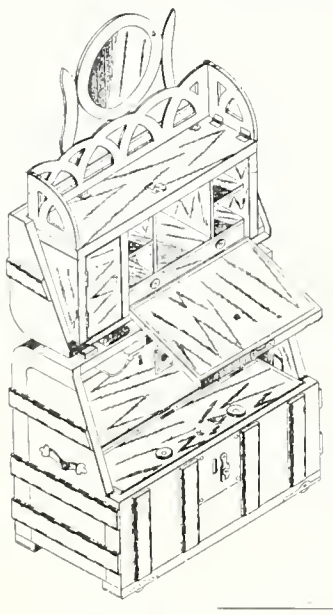
"My fellow citizens, members of this first convention of inventors and manufacturers, assembled to observe the centennial of the patent system of the United States: My connection with this meeting must necessarily be very brief, and may seem to be quite formal. Other engagements will prevent the enjoyment by me of the treat that is in store for you in the addresses which will be delivered by the distinguished men whose names are upon the program. I can only by my presence here, and these few introductory words, opening and constituting this Congress, express my appreciation of the importance of this occasion, and my hope that your gathering may be promotive of those branches of science and art in which you are respectively interested.

It distinctly marked, I think, a great step in the progress of civilization when the law took notice of property in the fruit of the mind.

Ownership in the clumsy device which savage hands fashioned from wood and stone, was obvious to the savage mind; but it required a long period to bring the public to a realization of the fact that it was quite as essential that invention, taking shapes useful to men, should be recognized and secured as property. That is the work of the patent system as it has been established in this country. It cannot be doubted by any, I think, that the security of property in invention has been highly promotive of the advance our country has made in the arts and sciences. Nothing more stimulates effort than security in the results of effort."

ROBT. W. FENWICK.

Combination Trunk.



The accompanying illustration indicates something decidedly new and novel in the trunk line that will be especially appreciated by the commercial tourist on the "back woods route." The invention consists of compartments of a trunk so arranged as to allow one section to be swung up upon the top of the other, revealing the interior of the trunk and combining the features of a writing desk, a bureau and packing case. The inventor is Isaac B. Kauffman, of Marble Hill, Mo.

Names of Patent Solicitors.

Names and addresses of attorneys practicing before the United States Patent Office, carefully compiled by Virginia W Middleton, for sale by the INVENTIVE AGE; cloth $1.50; paper $1 Edition limited.

LAUNCHING OF A GREAT STEAMSHIP.

(*Continued from 1st page.*)

lessly down the slope of her ways like a thing of life and takes to her destined element on a perfectly even keel with a dip of her graceful bow to an admiring audience, and then floats the tide as if serene in the majesty of a graceful debut.

No one who has not felt the responsibility of such a work can even faintly appreciate the triumphs of such a result.

When a vessel is launched she is taken at once to the shears and the boilers and engines are hoisted on board and the whole vessel carried on to completion.

The principal dimensions of this great American line steamer are as follows: Extreme length, 554 feet and 2 inches; length between perpendiculars, 535 feet and 8 inches, and extreme breadth 63 feet; depth of hold, moulded, 42 feet, and her entire tonnage is 11,000.

The motive power consists of two quadruple expansion, vertical, six-cylinder engines on four cranks, driving twin screws with working pressure of 200 pounds of steam, supplied by ten boilers, and will develop 20,000 horse-power. Besides the main propelling machinery there are forty-nine auxiliary engines.

The frames were raised July 27, 1893, and launched November 12, 1894, which to all American citizens is an assurance that the shipbuilders of America are fully capable of speedily and successfully competing with the great ship yards of Scotland, and what is of still more satisfaction is the fact that she is of American mould, design and material, and being built by American skill and brawn; and even more than all is the fact that it is only a beginning of a new era of American advancement along the line of shipbuilding, as it is already stated that several larger and speedier, if possible, American liners are to be built in the near future.

In 1891, at the request of Prof. Bolles, Chief of Bureau of Internal Affairs, State of Pennsylvania, Mr. Henry D. Cramp, of the shipbuilding firm of William Cramp & Sons, prepared, for the Annual Report, the most complete and exhaustive article on shipbuilding ever prepared in this country. We are indebted to this Report for much of the data in this article.

A Gripsack Umbrella.

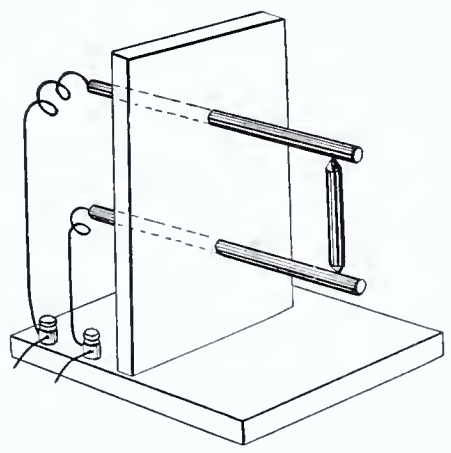
One of the most popular of recently patented novelties is an umbrella or sun shade that can be carried in an ordinary gripsack and adjusted to a large variety of uses. The cuts accompanying this item illustrate the use of this novelty on bicycles. From a small enterprise in Norwich, Conn., the manufacture of these novelties has developed into a large establishment employing several hundred men, in Glens Falls, N. Y., to which point the factory was moved some time since. M. Ames is president of the company and J. .A Holden, secretary. The mechanical features of the gripsack umbrella are peculiar and valuable. The handles are made in two and three sections and aluminum is now entering into the manufacture to a considerable extent.

In the material for covers silk, taffeta, gloria and cotton are respectively used. Silk is used as covers for that grade of the umbrellas which will retain their full length, not being constructed to fold. Cases of either rubber or leather, of light character, are manufactured for those to be folded, in which process the cover folds back from the bottom, the braces working upon central hinges. The "gripsack," also the "bicycle" umbrellas, have a patent attachment which holds the umbrella and has six various positions in its capabilities. The bicycle umbrellas have two distinct forms. One similar to a carriage or an oblong canopy; it can, as well be folded and plaeed away in security. It is virtually like, in general essentials to a carriage top.

SCIENCE FOR YOUNG PEOPLE.

Conducted by E. P. LEWIS.

The resistance offered by a rod of carbon to the passage of an electric current varies to a remarkable extent, when the rod is heated or compressed. This principle is utilized in the microphone, invented by Hughes, which, with the help of a telephone, will magnify small sounds to a surprising degree. The microphone is very simple in construction, and may easily be made by any one. A piece of white pine wood about 10 inches high by 6 inches wide is screwed upright to a wooden base. Two rods of arc light carbon, A and B, are fixed in holes through the upright and connected by wires with binding posts on the base. A third carbon rod C has its ends sharpened and loosely fitting in holes near the ends of the other two rods. The binding posts are connected with an electric battery, with a telephone likewise in the circuit. Even if the telephone is many miles away the walking of a fly or the ticking of a watch on the base of the microphone may be distinctly



heard. The waves of sound, small as they are, set the carbon rod in vibration, and the resulting variations in pressure at the points of contact cause changes in the current which are detected by the telephone.

* * *

The Blake transmitting telephone is very much like the microphone. A small carbon disc is very gently pressed against the diaphragm of thin iron, by a platinum wire; through both of which the line current flows. When the diaphragm is set in vibration by the wire, the carbon disc is compressed more or less, the resistance changes, and the changes in the current set the distant receiving telephone in vibration.

* * *

The tasimeter, an instrument invented by Edison for the detection of small quantities of heat, is almost exactly like the microphone. If you replace the telephone of the latter by a sensitive galvanmeter, and hold your hand near the rod C you will see a deflection of the galvanmeter needle. This is due to the fact that the heat of your hand warms the carbon and diminishes its resistance, so that there is a temporary increase of the current.

* * *

The electric current in passing through conductors heats them more or less according to their resistance. In an incandescent light circuit the little strip of carbon in the lamp is raised to a white heat, while the copper wire which brings the current to the lamp is not sensibly warmed. The reason is that copper is a very good conductor, while the carbon offers a very high resistance to the passage of the current, and in overcoming this resistance heat is developed. It was a long time before this property of bad conductors could be applied to lighting, because there is no substance which would not either melt or burn when raised to such a high temperature in the open air. Platinum, which is one of the most difficult metals to melt, can easily be fused by the current, so its use was soon given up. Carbon has never been melted, the highest temperature ever produced only softening it, but if it is heated in the air it is burnt up. That is, it combines chemically with the oxygen of the air, and oxidization is the scientific name for burning up. For this reason the carbon strip must be enclosed in a glass bulb from which all the air has been removed.

It is not easy to make such fine carbon strips as those used in incandescent lamps which are sufficiently strong to hold together. Edison in 1879 first succeeded in doing this. He found that a certain kind of bamboo cut into strips and carbonized would answer the purpose admirably. The strips are first wrapped around a nickel mold which gives them the proper horseshoe shap. The molds are then packed in powdered charcoal and raised to a red heat. Everything except the carbon in the strips is driven off by the heat, and the packing, by preventing the oxygen of the air from getting to them, keeps them from burning up.

There is another method, called the Swan process, for making these useful little strips of charcoal. Cotton thread is dipped in a solution of sulphuric acid, which by its chemical action turns it into a semi-transparent gelatinous substance which after drying becomes a tough horn like thread. These threads are made perfectly uniform by drawing them through holes in a plate of metal, just as wire is drawn. They are then wrapped around molds of the proper shape and carbonized as in the Edison process. They are then placed in a vessel filled with coal gas, which is itself largely composed of carbon, and "flashed." This means that a strong current of electricity is passed through them, which heats them and at the same time breaks up the coal gas so that some of its carbon is deposited on the weak places of the strips, making them firmer and more compact. The filaments are then sealed in glass bulbs, their ends being fastened to platinum wires which pass through the glass and make connection with the external wires carrying the current. The bulbs still open at the top into a narrow glass tube. This is connected with a very perfect air pump, by which the air is exhausted. An electric current is then passed through them, and by its heating effect drives out the air and other gases which are always absorbed by cold charcoal. These are likewise drawn out by the pump, the tube is sealed by drawing out the glass tube in a blow pipe flame, and the lamp is complete. The little cone of glass at the top of all electric light bulbs is where the little tube was sealed.

* * *

The light of the electric arc is due to the actual combustion of the carbon rods, which goes on in the open air. These rods are usually made of powdered coke and what is known as gas carbon, which is formed in gas works in making gas. This is mixed with a syrup or mucilage made of sugar or gum, and powerfully compressed in molds. The rods are then baked, dipped again in the syrup, and rebaked, so that finally all the pores are well filled by the carbon resulting from heating the syrup.

* * *

Phosphorus, a remarkable substance which together with lime, forms the greater part of our bones, is so easily oxidized that if left in the open air it will soon burn up. It is a light yellow wax-like substance, which can be extracted from bones by a chemical process. It must be kept under water, and handled with great care, as it is not only very poisonous, but will produce painful burns when it touches the dry skin. One of the strangest things about it is that if kept for a long time exposed to light while under water, or heated in an air tight tube, it seems to become an entirely different substance, turning red and losing its poisonous properties to a great extent. For this reason, this kind of phosphorus is largely used for making matches, the workmen not being so liable to poisoning, which is almost sure to result from the use of the first kind.

Expressions of Approval.

STRUCK 'EM HARD.

BOERNE, TEXAS, Oct. 19.—I got caught once but have not bit a second time. I have got the satisfaction of the $1 for the "Inventive Age" already and it is worth ten times more.

Capt. C. B. HOBROD.

DOES'NT WANT TO MISS AN ISSUE.

PITTTBURG, PA., Sept. 16.—I cheerfully enclose $1 to continue my subscription. Do not miss a single number.

FANELLY ALDEN.

A GOOD ADVERTISING MEDIUM.

NORTH YAKIMA, WASH., March 6.—Your paper with cuts have reached me O. K., and have had several inquires from parties in reference to the adding machine. I am more than pleased with your "adv," and will recommend you to any parties who want to advertise. This same work if done by any of the Patent agencies would have cost from $25 to $60 and they want from 10 to 20 per cent of the price of the machine and a lot of other things.

W. J. ANMILLER.

A VOICE FROM JERSEY.

CAMDEN, N. J.—Have learned much, and obtained many suggestions from the INVENTIVE AGE. It is distinctly an inventor's companion, keeping within its particular field and digging deep. It is a capital paper for all young men with inventive proclivities and scientific bent.

HARRY V. W. STIVERS.

WHAT ARNOTT, THE CELEBRATED INVENTOR, SAYS.

GREENFIELD, O., May, 5.—I think your paper has more good articles and fewer poor articles than any other inventor's paper.

EUGENE L. ARNOTT.

A MONEY SAVER.

EDITOR INVENTIVE AGE:—If I had taken your valuable paper sooner, I would have saved considerable money which the swindling patent sharks have fished from me.

SILAS E. WHITE,
Watertown, N. Y.

BEWARE OF "ADVANCE FEE" BROKERS.

MARENGO, ILL., Sept. 18, 1894.

MR. EDITOR: My experience as an inventor with those so called Patent Brokers is not very favorable, especially with those who want advance fees. I never knew of a firm of the kind to do anything worthy of note. My experience is that nine-tenths of all such firms are frauds. A first class house knowing its business can tell exactly whether the invention will pay or not, before they tackle it, consequently they take no real risk when they take hold of an invention of merit. If they do not know then they are certainly unfit to do the business.

JOSEPH H. BOWLEY.

Books and Magazines.

The holiday number of Trade Mark Record, issued December 12, was a handsome as well as interesting number. Among the features is an article from T. A. Seely, on "Proposed Changes in Trade Mark Legislation." There are also numerous biographical sketches, among the subjects being Hon. John S. Seymour, Commissioner of Patents.

* * *

The Photographic Times, New York, will in future appear as a monthly Photographic Art Magazine. The January number, just published, contains a superb photogravure frontispiece, besides over a hundred illustrations, including many beautiful half-tone reproductions. Among the numerous interesting articles are: "The Portraiture of the Moon," by Walter L. Woodbury, editor of the magazine; "The Kinetoscope, Kinetograph and Kinetophonograph," giving a description of these marvelous inventions, and "On the Road to the North Pole with a Camera," by the official photographer of the Dr. Cook Arctic Expedition. All the articles are well illustrated with numerous photographic reproductions.

* * *

"Bore Hole Wells for Town Water Supply" form the subject of a very interesting paper in the January number of Cassier's Magazine by Mr. Henry Davey, a prominent English engineer. Mr. Davey refers particularly to one of the most important examples of recently executed work in this field, and accompanies his remarks by illustrations, very clearly showing the arrangement of the pumping machinery adopted and the manner in which it was erected. Water works men will find the paper particularly interesting.

* * *

Power, one of the most substantial and reliable technical magazines published, was ten years old last month and the event was celebrated by the issuance of the largest and most interesting number of Power ever published. The special field of this magazine is that covering all matters relative to the economic generation and transmission of power, and in this line no magazine enjoys the confidence of mechanical engineers to a greater degree.

* * *

"Bread From Stones," translated from the German and published by A. J. Tafel, 1011 Arch street, Philadelphia, is the unique title of a well written work on fertilizing, by Julius Heinel and other noted writers on the subject of fertilizing in all agricultural lines. The subject is treated from a purely scientific and chemical standpoint and "Bread From Stones" will be a valuable help to those interested along these lines.

* * *

The Scovill & Adams Co., of New York, publishes the American Annual of Photography and Photographic Times Almanac for 1895, have in this, the ninth edition, given to the photographic world the most complete and exhaustive treatise on the subject of photography that has probably ever been published. It is not only filled with the rarest thoughts but is, from an artistic view, a rare work of art, and one that gives the most valuable tables of instruction to not only amateur photographers but to the professionals as well.

* * *

The National Builder, Chicago, is now published weekly. The fourth issue in each month will contain the illustrated, architectural and scientific information heretofore appearing in the monthly.

* * *

The Thirteenth edition of the London "Electrician Trades Directory and Handbook" will be out this month. The comprehensive character of this work is indispensable to anyone engaged in the business, and it is said the forthcoming volume will be better than any of its predecessors.

The Rights of an Inventor.

EDITORS INVENTIVE AGE: I enclose a clipping from the Farmers' Union, a populist paper published at Chicago.

A correspondent writes that "about every other farmer" in his neighborhood is using a new-fangled corn-cutter that it costs only about $5 to build but that the dealers are charging from $18 to $20 for them and that the manufacturers are threatening to damage the farmers who are making and using them without leave. He says further that the machine is "not exactly like the one the dealers have for sale, but the principle is the same." And he wants to know if it is patented.

The paper replies that the thing is probably patented, that "nearly everything is patented," but that "it is a question, whether, upon so simple a device, any royalty could be collected."

Now is it the fact that the Patent Office and courts are against the inventor who is not smart enough to invent something complicated, or can it be that the patent editor of the F. U. is not "up" on patents and that he has given bad advice? On the face of things it would seem that an inventor who has presented the world with a machine worth from $5 to $20 to "about every other farmer," ought not to be skinned of the wealth he has created by invention. The F. U. does not say the cutter was not invented, that it just came into the world Topsy fashion. It is silent regarding possible rights of property in the invention, and says it is very simple and can possibly be used with impunity. This paper is a fighter of plutocrats and monopolies and it would appear from the remark "that nearly everything is patented" that it has a spite against patent monopolies.

What is a patent worth if it is not legal property? And what is the use to invent without having a patent?

Some people want other people to be honest, but want the other people to be honest *first*.

Possibly the editor of the paper mentioned has a willingness to recognize the rights of other people, but I doubt if the inventor of the corn-cutter aforesaid can see it in the advice about corn-cutters.

C. S. BOOTH.

Camp Point, Ill., Dec. 11, 1894.

OPPOSED TO ADVANCE FEES.

LEWISTOWN, MO., Nov. 17, 1894.

Inventive Age, Washington, D. C.

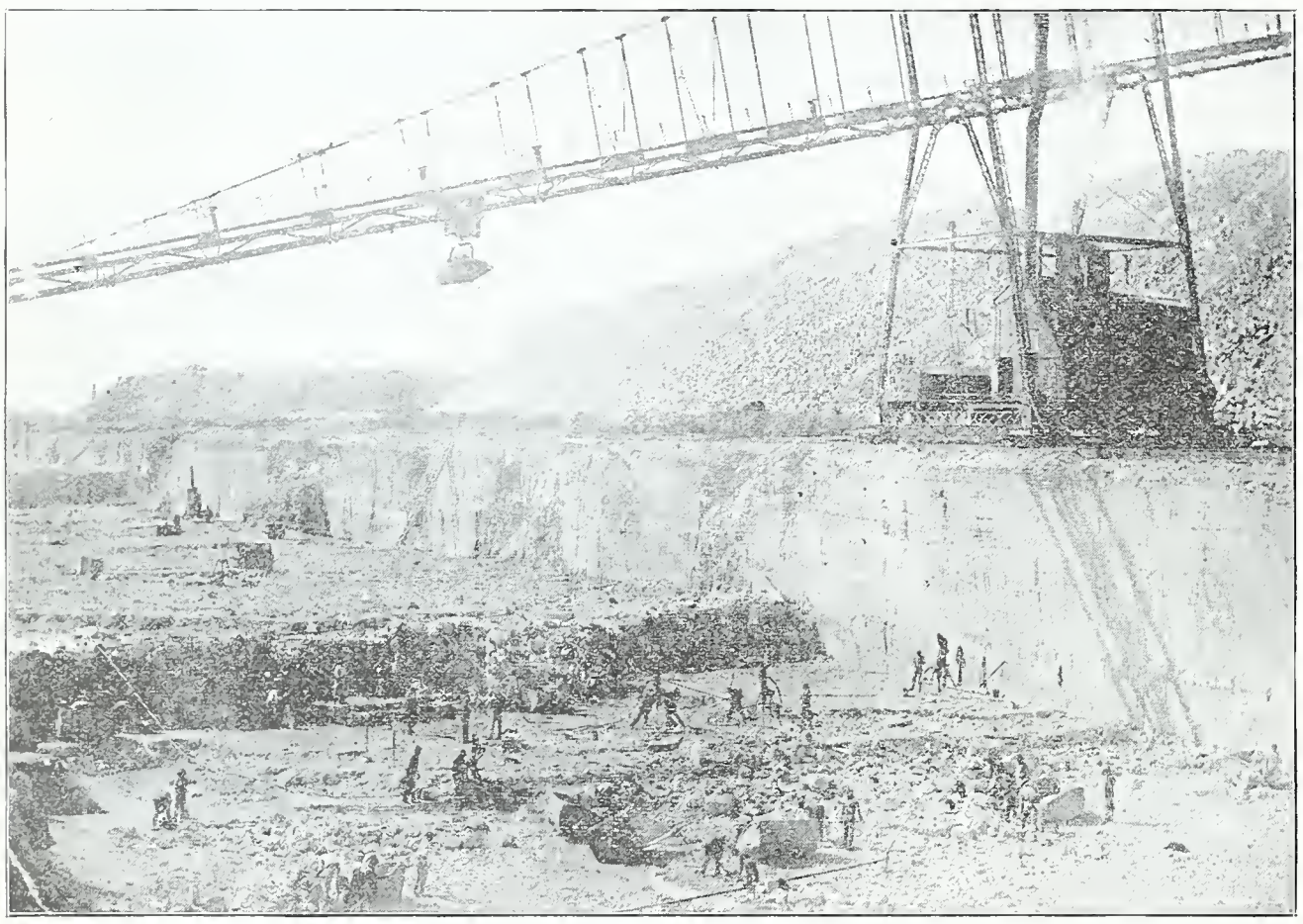
DEAR AGE: It does seem to me that it is not a correct principle under any circumstances whatever for patent sellers to expect an advance fee for selling patents. If a patent is worthy of sale it ought to bring the seller say from $500 to $10,000 or his commission and he ought to be competent to judge of the probability of the salability of the patent. He then has a chance to know the probability of what he can do and the patentee has no possible chance to form a well founded idea of what he will try to do. He may do a fair thing by some well known parties to get their confidence and a good word from them and yet in 99 cases out of a 100 never try to benefit those who pay an advance fee. As compared with the commission for selling a patent how insignificant is $10 or $25, and the very fact of a party's insisting on that ought to convince the patentee that he doesn't expect to sell the patent.

W. W. KING.

EVERY invention and the name of every inventor appears in the INVENTIVE AGE as soon as the patents are issued. Subscribers of the AGE will also be entitled to additional special mention without cost.

The Chicago Drainage Canal.

The great drainage canal now under construction, connecting Lake Michigan with the Mississippi, is one of the most important pieces of engineering ever undertaken. Since the inception of the work there have been expended over $10,000,000 on the enterprise and it is estimated that $17,000,000 more will be required to complete it. Over 6,000 men are now employed. The magnitude of the enterprise and the vast amount of excavations to be made has stimulated inventors and occasioned great improvements in labor saving machinery for handling rock and dirt on a large scale. Something larger than the ordinary steam shovel was necessary and as "necessity is the mother of invention," the requirements of the Chicago drainage canal were anticipated in an invention—a huge excavator and carrier—designed by Messrs. A. J. Mason and Frank H. Hoover, of Kansas City. This machine is 640 feet in length, is constructed of steel truss work throughout, and resembles a cradle in shape. The body is 320 feet in length, from each end of which extends a cantilever projection, one being 178 feet in length, with its tip 90 feet from the ground, and the other being 142 feet long, with its tip also 90 feet from the ground. The body of the machine extends across the bed of the canal and on each bank rests on huge steel flat cars of the Krupp gun car pattern, which move on a broad gauge track. Four plows are operated in the canal bed by a large chain moved by a 50 horse-power engine. Two scrapers connected with the plows throw the earth on an endless conveyor consisting of a series of steel pans. The conveyor passes out to the end of either arm and empties the earth either into cars or on a dump as desired. An engine of 175 horse-power operates the conveyor. It is stated that this machine reduces the cost of earth excavation as low as six cents per cubic yard, while contracts have been let on the canal at rates varying from 17 to 30 cents.



EXCAVATING IN CLAY POCKETS, CHICAGO DRAINAGE CANAL.

We are indebted to the courtesy of the Railway Review for the illustration presented herewith, which shows one of the Brown cantilever derricks at work in a "clay pocket." Of some of the features of this work, Brick, a Chicago magazine, says:

"The great engineering work, the importance and magnitude of which the world is only just beginning to realize, presents some special features of interest to us for in addition to the enormous quantities of clay that are excavated, so-called pockets of clay are met with in the solid rock. These are very interesting to anyone but the contractor, to whom they are only a trouble and expense. In section thirteen of the canal the rock is soft and crumbling and contains, in places, large pockets of clay. Our illustration shows the clay deposits and where they are cut through a bad break is made in the bank, which must be filled in with a cement wall. This adds greatly to the cost of the work and seriously interferes with the channeling. The channeling is done in the usual way and the rock is blasted. The price paid for the removal of the rock is 74¾ cents per cubic yard. The retaining walls rendered necessary by the clay pockets, cost $3.25 per cubic yard. As a matter of course, the plant used is most complete and efficient."

Science Needs a Mechanic.

Scientists could make little progress without the co-operation of mechanics, says the Washington Post. But for the skill of such men as Alvin Clark, the celebrated lens maker, astronomic science would have halted long ago. It is believed by many that there are insurmountable difficulties in the way of any considerable enlargement of the telescope, and that but little further progress in that direction is practicable. But this is probably a pessimistic view of the subject. Scientific investigation has accomplished many things that the world has written down on the list of the impossible. What seems impossible today may be shown to be quite feasible a few years hence. Of course there must be a limit to the size and power of refracting disks, and that limit seems to have been closely approached, but astronomers expect further assistance from mechanical art, and this expectation will probably be realized.

A microscopic discovery announced at the recent meeting of the British Scientific Association, at Oxford indicates that the mechanic is needed, just now, to help the scientist in a line of invention quite as important as anything in the field of astronomic inquiry. Prof. Schaefer, president of the section of physiology of the British Association, declared that he had discovered that each organic cell in vegetable and animal life contains an infinitesimal particle which manifests definite and controlling functions and which appears to be, in fact, the principle of life. Prof. Schaefer calls it the "attraction particle," because, despite its infinite littleness, "it exerts an extraordinary influence over the whole cell, which may be many thousand times its size. It initiates and directs those processes which result in the multiplication of cells."

The supposed foundamental form element called a cell is usually invisible to the naked eye. Bearing this fact in mind we can get an idea of the extraordinary character of the statement of Dr. Schaefer that "he has discovered the life principle in a particle thousands of times smaller than the cell itself. After magnifying the cell 1,000 diameters the central particle, the 'attraction particle,' or the living principle, appears under the most powerful microscope merely of the size of a fine point." Recent advances in the construction of microscopes are to be credited with having made this discovery possible, and we may confidently expect such further improvements as will enable scientists to test the professor's statements. There may be nothing of value in the alleged discovery, but it is just possible that it is the great scientific event of the century.

Women as Inventors.

BY EDWARD P. THOMPSON, M. E.

POLITICAL INVENTIONS OF WOMEN.

Women have stood high in the direction of originating philanthropic and political inventions. The former are too well known to be noticed here. An illustration of the latter is that of the Right Hon. Angela Georgiana Burdett-Coutts, Baroness, who during the first part of this century invented the plan of bringing under government inspection, by means of travelling inspecting school masters, small schools in remote rural districts, so that public grants for educational purposes might be applied to them. Her plain was adopted.

WOMEN DISCOVERERS.

The King of Denmark decreed that the first discoverer of a comet after the year 1830, should be awarded a gold medal of twenty ducats. As practically all astronomers were men, it was a surprise that the discovery was made by a woman. To show that it was no easy thing to do, it is simply necessary to state that sixteen years elapsed before the award of honor was claimed by any one. The fortunate woman was Marie Mitchell, the daughter of Prof. Mitchell, and a descendant of Benjamin Franklin. She was too modest at first to apply for the medal, but she was gradually induced to do so by Edward Everett, through whose efforts and proofs the medal was obtained. The comet is known in Astronomy as Miss Mitchell's Comet. She became a member of scientific societies and published a work on Astronomy. She does not stand alone; for Caroline Herschel with a larger telescope, discovered five comets. These comets were all invisible without a telescope, and were apparently like stars. It was only by the curves of their paths and by their relative locations among the planets and stars that their true nature was known. More recently, in this connection, Dorothea Klumpke, of San Francisco, read an astronomical thesis before the professors of the Sorbonne at Paris and several hundred others, and received the degree of doctor of science. M. Barboux who made a complimentary speech in conferring the degree of the faculty, informed Miss Klumpke that the vote of the professors was unanimous.

POINT LACE.

What is true in this country of the sudden, and what might almost be called fashionable, custom of women's inventing, is also true in foreign countries, except that the inventions of European women began sooner and increased more gradually and are a little behind in number.

Every child in Germany has heard of Barbara Uttmann, of Saxony, and her point lace is used all over the world. She invented the process and apparatus for manufacturing this beautiful handiwork, which has since given employment to millions of operators and which has never been excelled. In Germany it is called "Klopeln Spitzen" which means literally "to make lace pointed." A former resident of Saxony, and now associated with the writer, and who has spent many hours viewing the manufacture of the lace, says that the apparatus looks like a long pin cushion bristling with pins arranged to outline a pattern or design. The operator manages from ten to fifty peculiar spools allowing the thread to feed over the pins alternately until the design is completed. The spools or bobbins are purposely of different colors so as to be easily distinguished. The process is exceedingly slow and very difficult to learn. Miss Uttmann founded schools where thousands learned the process. Since her time, her ideas have been incorporated in the construction of machines by which the lace is produced at wonderfully lower rates, and yet Barbara Uttmann's lace surpasses all. Nuns made lace in the fourteenth century, and after that, the art was lost and was both reinvented and improved by Barbara Uttmann in the sixteenth century. An interesting fact in her family life is that before she died at sixty-one years of age, she had seen sixty-four children and grandchildren.

When we admire the wonderful bas-relief, the Venitian point, the Portugese point, the Parisian, the Maltese point and the rose point, shall we not also admire and honor the great genius capable of being developed in woman, and especially remember the one so superior to the average man inventor as to be able not only to invent, but also to introduce the invention into practical use, and beyond all this, to establish schools for spreading its manufacture throughout her country?

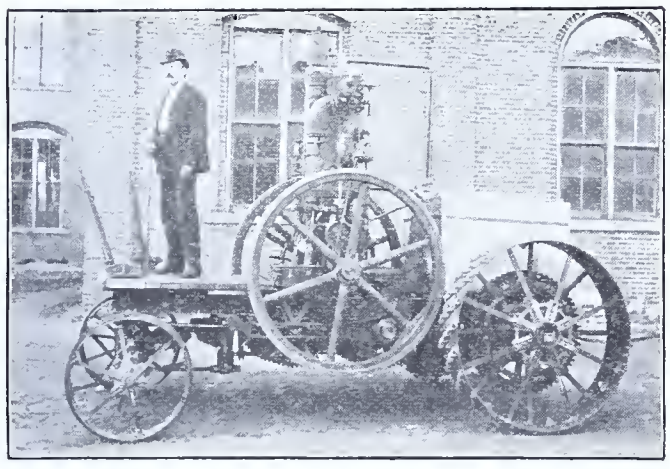
The Quast Gasoline Traction Engine.

More than half a century has elapsed since the first steam traction engine made its appearance in the field and for many years great numbers of various styled engines have been brought into the market. No sooner had the first steam traction engine become an accomplished fact than improvements rapidly suggested themselves and contributed to insure its success.

This desire for improvements finally brought the steam traction engine to as near perfection as possible for this class of engines. The energetic inventor found that he had to find another agent than steam which would be cheaper and better for many reasons for the purpose of furnishing power in a traction engine.

The old saying, "necessity is the mother of invention," is true and the result of this is the construction of the gasoline traction engine having three-fourths of the weight of a steam traction of equal power and using 50 per cent less in the cost of fuel.

Steam traction engines are built to furnish almost double their rated power and so also is the gasoline traction engine which is shown in the accompanying cut. The engine represented is the invention of Mr. Charles Quast, of Marion, Ohio. It is a 16 horse-power developing 32 on the brake. The principle of all gasoline or gas engines is such,



THE QUAST TRACTION ENGINE.

their speed cannot be varied or their motion reversed like the steam engine, but must run at a nearly uniform rate. Therefore special mechanisms were required for transmitting power to the drive wheels at any desired rate of speed. It was absolutely essential to complete success that this should be accomplished, in such a manner, that the speed and direction or motion of the traction could be varied at will by the engineer by moving a single lever. The mechanism employed is positive in action, noiseless and durable. It prevents giving shocks or jars to the engine, when starting, stopping or reversing. This device gives the full power of the engine at the moment the traction starts, whereas a steam traction engine has to reach its speed first in order to give full power.

This engine has a few advantages over a steam engine, some of which are as follows: As the cut shows, the operator stands in the front of the engine and has nothing to obstruct his view; there is no boiler and consequently no fire box, no fire, no smoke, no sparks, no leaky flues, no water steam and no skilled engineer, no waiting for water while threshing or traveling, no watching of the water and steam gauges and consequently no boiler explosions; no getting up of steam in the morning as the gasoline traction engine is ready to start in five minutes, thus saving fuel. The engine does not need to be turned after the separator has been placed between the stacks, no long belts to contend with as the engine can stand right between the stacks without danger of fire as there is no fire. No stopping of the engine in changing from traction to separator power. There is no consumption of fuel unless the engine is running and this is one gallon of gasoline per horse-power per 10 hours, or if the engine runs 10 hours developing 10 horse-power it will consume 10 gallons of gasoline, or if it develops 18 horse-power for the same time it will use 18 gallons. The oil which can be bought anywhere for less than 10 cents a gallon evidently is very cheap fuel.

In the cut shown the center lever is the steering lever. The steering is done by power. In shoving the center lever either to the right or to the left, the wheels will cut correspondingly. To the right of the operator is the operating lever of the traction, the moving of which starts, stops or reverses the traction. On the left side is the speeding lever, the moving of which will give the traction three or more positive speeds.

The traction gear is novel and is superior to any steam traction gear used.

The steering mechanism is of very durable and simple construction and operated either by the power of the engine or by hand (if so desired) in less than one-fourth of a minute.

Behind the operator is the engine of vertical type, behind which is the cooling water tank and the gasoline tank. The latter carries a sufficient supply for three days average work and the water tank requires the addition of two buckets of water a week.

The engine itself which has overcome all the difficulties heretofore known to gas and gasoline engine builders is very simple in its construction and is the result of many years experience. The engine has only two valves, one suction and one exhaust valve and no slides or cogs or igniting valves are used. The great difficulty in the way of constructing a satisfactory gas or gasoline engine has always arisen from the suddenness of the explosion and expansion which has to be utilized. The operation of the engine is as follows: First, the gasoline which is pumped by a force pump into a chamber below the suction valve, is drawn into the cylinder as a vapor mixed with air during the down stroke of the piston, and second, compressed during the return stroke; then the charge is ignited and this forces the piston downward. During the return stroke of the piston, the waste products of the charge are expelled. The engine is entirely automatic for the governor controls the suction valve, the exhaust valve, the gasoline pump and the ignitor which makes the engine almost perfect in regularity. The engine is comparatively noiseless, runs smoothly and steady and does not jerk and jar every time the ignition takes place. The starting is very easy in any kind of weather and gives full power after the first revolution.

The ignition of the charge is accomplished by an electric spark furnished by an electro magneto, abandoning the troublesome hot tube which constantly has to be renewed and also the battery if a spark is used. It will be seen that the weight of the engine is favorably distributed on the four wheels to furnish the best adhesion to the ground in traveling. The engine has two heavy fly-wheels, one on each side of the cylinder and a friction-clutched belt pully on one side of the cylinder and the driving pinion gear near the other fly-wheel to drive the traction, both being arranged to be connected or disconnected without stopping the engine.

This engine can be made in sizes from 6 to 100 horse-power and is especially designed for threshing, plowing and any other field work desired. The engine can be used to run anything which is to run by power and taken from the traction, it makes a first-class gas or gasoline stationary engine. This can be done easily by taking out a few bolts.

Annuities for Inventors.

Many foreign governments give annuities to authors, but I have yet to hear of any country that confers a similar favor upon inventors.

Now it is an uncaviled fact that inventors, as a rule, confer more benefits upon humanity than any other one class of people. Their magic touch has revolutionized the world, making labor less burdensome; lessening the hours of toil; lending wings to ship and car; annihilating space by means of telegraph and telephone; lighting our highways, byways and houses with electricity, and conferring countless other blessings upon mankind.

This being the case, it strikes me that right and reason unite in demanding that an annual sum be set aside for our inventors—particularly for those inventors who are "down on their luck," and who haven't the means of ever taking out patents for their inventions.

It strikes me, further, that the government should grant patents free of cost, and that the Patent Office should be supported by general taxation. It so happens under the present system that many a man is unable to pay or having a really meritorious invention patented, and the result is that the world is deprived of a useful article for a long period of years, if not forever. Many a man who has given long days, nights, and even years to solving some intricate problem in mechanics at the same time struggling with poverty in its worst form, finds the solution at last, only to realize that he hasn't a dollar with which to pay for a patent, and perhaps, while waiting, some one else hits upon the same solution, secures a patent and the original inventor is left in the lurch.

WILL HUBBARD KERNAN.

THE INVENTIVE AGE publishes each month a list of attorneys who for any reason have been disbarred from practice before the U. S. Patent Office. There are swindling attorneys as well as patent sellers and inventors are warned against them by the INVENTIVE AGE.

WE can recommend the new Climax $2 watch, advertised in another column, as a good time-keeper, handsome in appearance, durable and the greatest bargin ever offered in watches.

WE have issued a special premium list for the purpose of giving the readers of THE INVENTIVE AGE a large selection of useful books and novelties at cost price.

Evolutions of Invention.

Prof. Otis T. Mason, curator of the department of ethnology, United States National Museum, lectured in Baltimore on the 14th ult. at the University Club on "The Evolution of Inventions." He said in part:

Invention has to do with natural resources and forces. In the earth, the waters, the air, were to be found the materials about which the artificialities of the true human life were to be created, its industries, æsthetic arts, language, social life, philosophies and religions. We approach these materials:

1. To explore, secure and domesticate.
2. To manufacture and reconstruct.
3. To move them and ourselves artificially.
4. To exchange, measure and value them.
5. To consume and to enjoy them.

The manipulation of these natural endowments involves the capture, domestication and training of force or power.

1. Man power, the hand epoch.
2. Fire power, epoch of human mastery.
3. Beast power, epoch of domestication.
4. Wind power, epoch of the sail.
5. Water power, epoch of rude machinery.
6. Steam power, epoch of machinery.
7. Chemical power, epoch of scientific manufacture.
8. Electric power, epoch of ideal invention in speech, light and locomotion.

The application of these forces to the resources at man's disposal lead him by and by to the invention of what are termed the 'mechanical powers,' which are devices for changing the directions of motion or for converting time, distance, weight and momentum. These devices came in some such order as follows:

1. The weight for hammers and clubs.
2. The elastic spring in bows and traps.
3. The inclined and declined plane in locomotion and transportation.
4. The wedge in riving and tightening.
5. The sled on snow or the prepared track.
6. The roller, both as load and as bearing.
7. The wheel in travel and carriage.
8. Wheel and axle.
9. Pulleys.
10. Twisting, shrinking and clamping device.
11. The screw.

In putting all of these series into activity necessarily were developed tools—for striking and for rectilinear and curvilinear motion, and producing the effect to break, batter, chip, abrade, polish, cut and perforate. The working part of the tool maintains a remarkably steadfast plan of functioning, but the changes of the manual part have constituted the history of machinery.

The changes produced by invention have taken place:

1. In the things invented commonly called inventions.
2. In all the processes and apparatus involved.
3. In the rewards and benefits of invention.
4. In the mind of the inventor.
5. In society as the result of these processes.

In every respect and along the lines just indicated inventive changes have been from:

1. Naturism to artificialism.
2. Simplicity to complexity.
3. Clumsiness to delicacy.
4. Discomfort to comfort.

In the human mind the evolution has been from copying and borrowing to predetermined invention.

The result has passed from the momentary gratification of an individual to the commonweal of all mankind in all time.

The reward has been magnified from the unlimited use until some one else copies the device to the granting of exclusive patents and crowning the inventor among the heroes of the earth.

The actual process of inventing has had a wonderful history. The first inventions were within the capability of a single man, the last inventions demand co-operative mind. Beyond this is to be found the legalized and prolonged co-operative mind, as in a legislature or a great establishment, and the crowning result of this process is the endowed and perennial co-operative mind, as in a great university of research exploring the geosphere, the hydrosphere, the atmosphere for new materials and forces to conquer.

THE INVENTIVE AGE is a thoroughly independent magazine, published in the interest of inventors. It costs but $1 for a whole year, and while we have received hundreds of complimentary letters we have yet to receive the first complaint. It is published at the seat of government, its building—erected especially for its own publishing business—being one of the handsomest blocks in Washington and located just one block from the Patent office. We extend an urgent invitation to all inventors to make our office their headquarters when in the city and whenever we can serve them in any way we are at their command.

Important features in next issue of AGE.

INVENTORS AND MANUFACTURERS.

Representative Character of the American Association of Inventors and Manufacturers.

The third annual meeting of the American Association of Inventors and Manufacturers will be held at the Board of Trade rooms in this city on the 15th of January, 1895, and THE INVENTIVE AGE takes advantage of this occasion to give its readers some information concerning the organization, its personnel and its purposes. As there has existed some misapprehension in regard to the Association and its objects, a brief explanation on this point is proper.

It is not a beneficial organization. It never has anything to do with the introduction or sale of patents. It is not a combination of inventors and patent attorneys, in league to rush applications through the Patent Office and secure the issuance of the greatest number of patents. It takes no part in the personal affairs of its members.

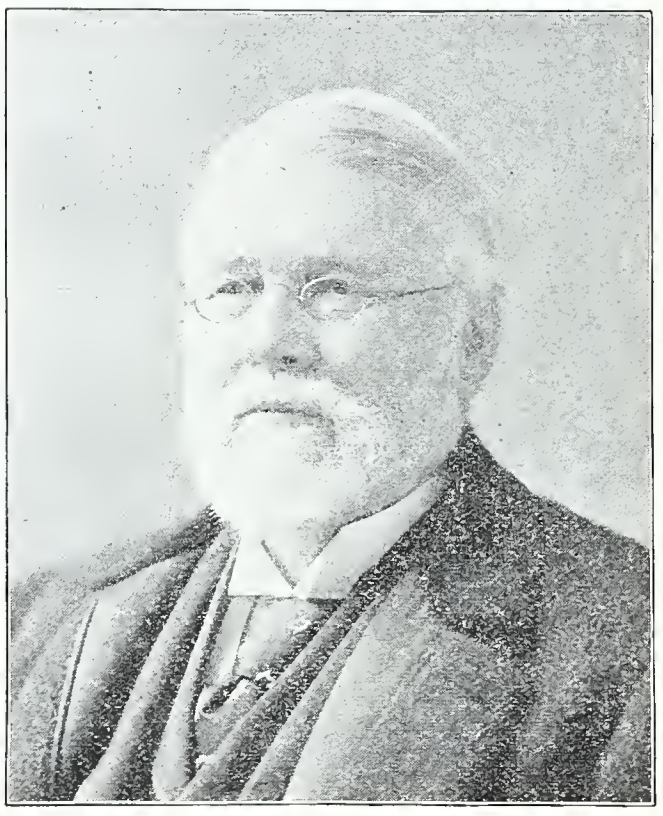
The objects of the Association as stated in the constitution are, "To promote the progress of science and useful arts; the diffusion of practical, scientific and legal information respecting inventions; the encouragement of favorable and the discouragement of unfavorable laws respecting property in patents; the co-operation of foreign inventors for reciprocal regulations under foreign patent systems; the proper, just and adequate protection of the rights of American inventors authorized by the Constitution of the United States." Briefly stated, in simple form, its purpose is to promote harmonious relations and secure just dealing between inventors and the users of inventions.

While it takes no part in the contentions of rival inventors or owners of patents, it does important work on behalf of such persons by promoting a better understanding of matters in which all are interested—and in securing proper action thereon. Inventors and their representatives are naturally inclined to be secretive and suspicious of each other and have often overlooked the fact that, on many vital questions, they have interests which are identical and on which they should make common cause. The Association affords a medium by which a good understanding can be reached and mutually helpful measures be put into practical effect. It also gives special attention to the interests of manufacturers whose business does not depend on patent rights. It is not so well known to the public as it should be that patents are being issued for things which have been in use many years. In numerous manufacturing establishments ingenious and valuable machines, processes and products are frequently originated for which patents are never asked and, occasionally, some honest inventor, after much labor spent in producing what he believes to be an original invention, discovers that he has a worthless patent issued by the Commissioner who had no means of ascertaining that the invention was old. Better facilities for the work of the Patent Office, which the Association uses its influence to secure, will aid in correcting this difficulty. The tendency of the work of the Association is toward the issuance of fewer and *better* patents. Furthermore the Association makes especial effort to guard the public from imposition by parties claiming patent rights that are fictitious or fraudulent.

One of the methods by which these ends are sought to be accomplished is educational. Very important papers bearing on various questions involved, prepared by members, have been printed and distributed.

Another important subject which the Association looks after is patent legislation. Arthur Steuart, is the chairman of the Committee on Legislation which has this business in hand. The patent system of the United States is regarded by the Association as the best in the world and no radical changes are desired. In a few particulars amendments to the existing law are recommended and urged. One of the most important duties of the Committee is to prevent improper legislation and in this it has been very successful. During every session of Congress a score or more of bills are introduced at the request of the owners of patents who have failed to secure what they regard as their rights from the courts, and who mistakenly attempt to have the laws changed to meet their cases without appreciating the injury it may cause to others. The Association aims to get the judgement of the most competent persons on the question of amending the patent laws, in order that it can properly present the matter to Congress whenever called upon.

Dr. R. J. Gatling, of Hartford, the President of the Association, is a North Carolinian by birthright, a Connecticut Yankee by inventive instinct and the most cosmopolitan of all men. He has travelled extensively and enjoys a wide acquaintance among public men in this and foreign countries. His name is indissolubly linked with death-dealing machinery and bloodly warfare, but personally he is genial, kindly and humane. A small number of his insignificant looking machine-guns, distributed among the principal municipalties of the western republic, hold at bay the rampant anarchists of all the eastern empires. For several years past Dr. Gatling has been studying the subject of heavy ordnance and has perfected and patented a method of manufacture which, it is claimed, will produce



DR. R. J. GATLING.

guns of very superior quality and at much reduced cost.

The first Vice-President, Gardiner G. Hubbard, is best known as the founder of the telephone business. He resides in this city, is President of the National Geographic Society and takes an active part in many educational and patriotic enterprises. THE INVENTIVE AGE of March, 1893, contained an excellent portrait and a well written sketch of Mr. Hubbard.

Geo. Harding, of Philadelphia, the second Vice-President, is one of the best patent lawyers in the country and has long had an extensive practice.

J. C. Anderson, of Chicago, is the third Vice-President. He combines inventive genius, business sagacity and administrative ability in a large degree. His principal business has been in the manufacture of pressed brick, for which he has several very large works in different parts of the country. By his method green bricks are loaded on full sized railroad cars, pushed through a thousand foot tunnel, in two lines, and come out at the end fully burnt and ready for shipment. During the last year he has adapted similar apparatus for the destruction of garbage and it is about to be introduced in several large cities. It is believed that this invention solves the vexed problem of the disposal of garbage.

B. H. Warner, the third Vice-President, is a prominent Washington capitalist and banker and the President of the Board of Trade.

Geo. C. Maynard, the Secretary and Treasurer, is a well known electrical engineer of this city.

The membership of the Association embraces men prominent in many branches of professional and commercial business, representing widely diverse interests, and clearly shows the high standing of the organization.

Among the inventors are Andrew C. Hallidie, the California engineer, who is universally recognized as the successful orginator of the cable railway system; the veteran Sylvanus D. Locke, of Hoosick Falls, New York, who has performed valuable service in bringing harvesting machinery to its present state of perfection; Thomas Shaw, the distinguished mining engineer of Philadelphia; F. E. Sickels, of Kansas City, who has made many valuable inventions in connection with steam and hydraulic engineering; James P. Lee, of Hartford, inventor of military arms; Herman Hollerith, of this city, whose wonderful machines tabulated all the statistics of the eleventh census, and Charles S. Taintor, the inventor of the graphophone. Electrical inventors are well represented by Elihu Thomson and Charles F. Brush leaders in electrical matters; Graham Bell and Emile Berliner of telephone fame, and the revolutionist, Nikola Tesla.

The list of patent lawyers contains the names of many men equally eminent. One of these to whom public attention is just now attracted is Judge S. R. Taylor, of Fort Wayne, Ind., to whose services on behalf of the Government in the recent suit to annul the Berliner patent, the victory over the Bell Telephone Company was largely due. A. Q. Keasbey, of Newark, N. J.; Lemuel W. Serrell, of New York City; Paul Bakewell, of St. Louis, Judge L. L. Bond, of Chicago, and W. C. Dodge, of Washington, D. C., are well known authorities on patent law. Hon. John W. Noble, of St. Louis, ex-Secretary of the Interior Department, and Wm. E. Simonds, of Hartford, ex-Commissioner of Patents, are also members of the Association. Arthur Steuart, of Baltimore, and Francis Forbes, of New York City, are authorities on trade-mark law of national reputation. Colonel A. T. Britton, of this city, represents a class of lawyers who have no connection with patent matters, but who are actively interested in promoting the objects of the Association.

Among the representaives of manufacturing interests we note the names of the following:

John H. Hall, of the Colt's Fire Arms Co., Hartford, Conn.; Albert L. Ide, engine builder, Springfield, Ills.; Albert A. Pope, President of the Columbia Bicycle Co. and the efficient leader of the "good roads" movement; C. W. Seamans, of the Union Typewriter Co. and John A. Fairfield of the American Writing Machine Co.; Gen. Wm. F. Draper, who is at the head of the oldest cotton machinery manufacturing company, at Hopedale, Mass., and S. R. Munger, whose company is in the same line of business in Birmingham, Ala.; A. J. Moxham, engineer of Tom Johnson's Steel Rail Manufacturing Co., at Johnstown, Pa.; H. N. Fenner of the New England Butt Co., Providence, R. I.; Geo. N. Bierce, one of the largest manufacturers of mill machinery in the United States, at Dayton, Ohio; Pliny Jewell, manufacturer of leather belting; F. A. Pratt, of the Pratt & Whitney Co.; W. H. Watrous, manufacturer of plated ware, and C. E. Billings of the Billings & Spencer Co., of Hartford, Conn., and Wm. H. Hart, of the Stanley works, New Britain, Conn. Agricultural machinery is well represented by Gen. Asa S. Bushnell, of Springfield, Ohio; George W. Kirkpatrick, Macedon, N. Y.; J. Russell Parsons, Hoosick Falls, N. Y., and George S. Schulte, of Milwaukee.

In addition to the above there are Charles J. Bell, President American Security Co. and Colonel F. A. Seely, of this city; Prof. Cyrus F. Brackett, of Princeton College; Octave Chanute, the distinguished engineer, of Chicago; Theo. N. Ely, General Superintendent Motive Power, Pennsylvania R. R.; Daniel Frazer, whose company does all the photo-lithographing for the Patent Office, and W. J. Johnston, publisher of the "Electrical World."

We print in this issue sketches of several members of the Association, with portraits, and shall

continue the work in our next number which will contain a full report of the proceedings of the meeting to be held on the 15th inst.

GEN. WILLIAM F. DRAPER.

Gen. William F. Draper is the head of the firm of Geo. Draper & Sons, of Hopedale, Mass., and has gained distinction, not only in the manufacturing world, but in political circles as well. He is serving his second term in Congress from the eleventh Massachusetts district, and his efforts toward preserving the present tariff system have been earnest and fruitful. Mr. Draper's ancestors were noted textile manufacturers. Thomas Draper, in England was a manufacturer of cloth, aud his son James, the earliest American ancestor of the Hopedale Drapers, was engaged in the same business in this country. Ira Draper, General Draper's grandfather, introduced improvements in temples for looms as far back as 1816, so there is a natural hereditary inclination for the business. General Draper was born in Lowell, Mass., 52 years ago. He received a common school education and gained practical experience in the making of every machine used in the manufacture of cotton cloth while yet in his teens. He served with distinction in the war, entering the service as a second lieutenant and retiring at the head of a brigade. At the close of the war he entered the employ of E. D. and G. Draper, then celebrated for the application of labor saving devices in cotton manufacture. In 1868 he became a member of the firm, the business he carries on to this day under the name of Geo. Draper & Sons. This firm introduced the Sawyer spindle and also brought out the double adjustable spinning ring, the Wade bobbin, the Doyle separator and improved warpers, twisters and spoolers, which have enabled the firm to successfully combat all competition. Following the Sawyer spindle came the Rabbeth, the introduction of which brought great advantage over all competitors, Since the death of the senior George Draper, Gen. Draper has been at the head of the firm and has not faltered in the march of improvement inaugurated by his father. General Draper is a busy man. He is an active member of many manufacturing, banking and industrial enterprises and notwithstanding the urgent demands on his time, took occasion to present to the last annual meeting of the American Association of Inventors and Manufacturers one of the most interesting papers read, the subject being the "Influence of Inventors on Cotton Manufacturing Industries." In this paper Gen. Draper expresses his great consideration for the American inventor and the patent system of this country. In speaking of our patent laws Gen. Draper says: "It is admitted that Americans are the most inventive people of the earth. The records show that they have advanced the cotton manufacture since Samuel Slater's first American cotton mill was started, in Pawtucket, R. I., in 1790, as much as, or more, than the inventors of all other nations put together. The reason of this is not that the American is necessarily a man of more ideas or more disposition to study into the laws of nature than other men, but that the patent laws of our country are more favorable to the inventor than those of most other nations. They offer inducement to thought and study, by protecting the result of that thought and study. In all changes that may be made in our patent laws from time to time care should be taken to maintain this pre-eminece, so that we may not destroy or lessen the incentives to invention, which, more than any other factor, are responsible for our wonderful progress during the last one hundred years."

GEN. WM. F. DRAPER.

SYLVANUS D. LOCKE.

The expression of such a sentiment is indicitive of the fact that the Association, as well as Congress, is honored by the membership of the author, and that the American inventor has, in General Draper, an earnest and true friend,

SYLVANUS D. LOCKE.

The subject of this brief mention was born in Otsego Co., N. Y., Sept. 11, 1833. Mr. Locke obtained the rudiments of a good substantial education in select schools and the common schools of that state. A creditable knowledge of the higher English branches, including geometry, trigonometry, surveying and astronomy, therein obtained was supplemented by three years diligent study in Academies. He went west in 1856 and engaged in civil engineering as an axman, in the employ of the Wisconsin Central Railway. His skill and industry won rapid promotions, through all positions of civil engineering to chief draftsman, in which position he won great distinction in planning of important viaducts and bridges. The financial crisis of 1857 resulted in many changes and unexpectedly Mr. Locke found himself principal of a seminary at Columbus, Ky. In 1859 he returned north and entered the law firm of Bennett, Cassidy & Gibbs, at Janesville, Wis. The environment of that section suggested the need of automatic grain harvesting machinery and for ten years Mr. Locke devoted his energies and directed his inventive genius in that direction. Not until 1870, while in the employ of Walter A. Wood, and after having experienced vicisitudes that would have discouraged any but a persevering mind, did Mr. Locke succeed in building a successful automatic reaper and binder. In 1873, just 13 years after he began his experiments, and after an expenditure of over $100,000, Mr. Locke sold the first self-binding harvester ever used by farmers. Some idea of the delopment of the industry may be gained when it is contemplated that in the 20 years that have elapsed since that time over 5,000,000 machines have been manufactured and sold.

A pioneer in the invention of self-binding harvesters, Mr. Locke has taken out something like 100 patents on these machines, and has for many years been engaged in important contests in the courts against some of the leading builders to obtain the compensation that is just and the recognition that is fair for an invention wrought with so much merit.

Mr. Locke has been a fruitful inventor in other than the harvester field. He has many patents relating to jointless vertical plane car couplers, electric vote annunciators for deliberative bodies, steel cross-ties for railroads, underground wires and pipe conduits, snow melting for streets of cities, line guide copy holders for typewriting machines, hop picking machines, malleable iron detachable link chain, detachable link chain belt made from band or sheet steel by automatic machines, paper testing machines, etc., etc.

GEO. N. BIERCE.

As an illustration of the possibilities offered to energy and perseverance in this land of ours, and as an example to the young and honest poor of the land, the experience and history, the defeats and successes of Mr. Locke ought to be of incalculable value, an inspiration to persistent effort and unfaltering purpose.

In his own country Mr. Locke has the confidence and approbation of all, and is a man the people delight to honor. A strong and zealous Republican, they elected him to the New York legislature in 1883, and remoninated him to serve a second term, but he declined the honor.

HENRY MARTYN BOIES.

In giving the biography of prominent members of the American Association of Inventors and Manufacturers, the one of Henry Martyn Boies, of Scranton, Pennsylvania, is one that certainly gives an incentive to the struggling genius of progress to all Americans. Mr. Boies has not only a wide reputation in his state but a national one as well. He was born in the town of Lee, Massachusetts, in 1837, of French Hugnenot parentage. He received a thorough, liberal and classical education at Yale, where he graduated in the class of 1859. In 1861 he became a member of the firm of Silver & Boies and for four years was engaged in the freighting and forwarding business at Tivoli on the Hudson river. In 1865 he removed to Scranton, Pa., his present home, and became the resident member of the firm of Laflin, Boies & Turck, powder manufacturers, and also indentified himself with all the progressive movements in his adopted city for the promotion of its best interests. In 1869 Col. Boies was elected president of the Moosic Powder Co., which position he still occupies. The frequent disasters from the careless making of cartridges by lamp light caused him in 1873 to exercise his inventive genius by the invention and patenting of a cartridge-package for mining powder, which has been universally adopted in this country and has largely reduced the casualties in coal mining. During the upheavals and excitment throughout the coal and iron regions of Pennsylvania in 1877 it became necessary to check the lawlessness and control the lawless spitits who threatened the state and city government. The well known City Guard of Scranton was formed and from his past experience as a man of brave spirit and great executive ability, Mr. Boies was earnestly requested to take command of the company, which position he held until they were mustered into the NationalGuard as a Battalion. In 1878 it was consolidated with independent companies surrounding into the 13th regiment, and he was commissioned as its Colonel and did active and efficient service in raising the standard of the National Guard to its present high position. In 1882 Colonel Boies was chosen president of the Dickson Manufacturing Co., which position he filled until his resignation in 1886. While at the head of the Dickson Manufacturing Co. he invented an improved steel tired car wheel, known as the "Boies' Steel Wheel," which has been extensively approved and adopted by the railroads of this country and large shops for its manufacture have been erected in Scranton. Mr. Boies is director in the Third National Bank of Scranton, President of the Board of Trade, President of the American Live Stock Express Co., also a director of many of the leading manufacturing companies. In 1884 was delegate to the National Republican Convention held in Chicago, but has never sought nor accepted any particular office.

HENRY MARTYN BOIES.

Col. Boies has always taken an active part in the affairs of the Young Men's Christian Association and from 1870 to 1874 was its President and in 1888 was again elected to the same position and at present is one of the Board of Directors. In 1886 he was appointed by Gov. Beaver a member of the Board of Public Charities and elected by the Board as a member of the Committee on Lunacy, whose members constitute the Commission of Immigration for the State of Pennsylvania. Mr. Boies is an active and prominent member and worker in the Presbyterian church and is always found at the heod of any movement that tends towards the advancement of science or his fellow man, and in the fullest sense is a man of the broadest action and progress.

THOS. D. LOCKWOOD.

Thomas D. Lockwood is an electrical engineer of great ability. He commenced business as a telegraph operator, served in many capacities of steadily advancing importance and is now electrical expert and chief of the patent department of the Bell Telephone Co. He has for several terms been the acting president of the American Institute of Electrical Engineers and was a member of the advisory committee of the Electrical Congress at the World's Columbian Exposition.

THOS. D. LOCKWOOD.

He has made numerous valuable inventions and is a forcible writer and lecturer. His books on telegraphic and telephonic subjects are regarded standard works by the profession.

GEO. N. BIERCE.

Geo. N. Bierce is the secretary of one of the largest manufacturing establishments in the country, located at Dayton, Ohio, employing about six hundred skilled mechanics and doing an annual business of a million dollars His company manufactures Flour and Oil Mill machinery, Hydraulic machinery, Steam Pumps, Turbines and all requisites for power transmission. The enterprise was started by Mr. Bierce in 1866. He is a native of Ohio, and was an officer in the army during the war.

Members of the Association.

The following representative men are members of the American Association of Inventors and Manufacturers. More extended individual biographical sketches will appear in subsequent numbers of the INVENTIVE AGE:

J. S. Alden, Mechanical Engineer,486 River Drive, Passaic, N. J.

Geo. Allen, Secretary, Franklin Paving Brick Co., Franklin, Penn.

J. M. Allen, President, Hartford Steam Boiler Inspection and Insurance Co., Hartford, Conn.

J. C. Anderson, President, Anderson Coke, Gas, Power and Reduction Co., 937-939 The Rookery, Chicago, Ill.

Albert F. Andrews, Avon, Hartford Co., Conn.

Eugene L. Arnott, Patent Solicitor, Greenfield, Highland Co., Ohio.

Harry Ashton, Rollturner, Cambridge, Ohio.

Joseph L. Atkins, Patent Lawyer, 930 F St., Washington, D. C.

Robert Stanton Avery, Publisher Phonetic Books, 320 A St., S. E., Washington, D. C.

Geo. M. Bailey, Manfacturer, 24 Erie St., Buffalo, N. Y.

Sterling L. Bailey, President, The Smead Warming and Ventilating Co., 324 Dearborn St., Chicago, Ill.

Paul Bakewell, Attorney, Turner Bldg., St. Louis, Mo.

Wm. C. Baker, Car Heating, 143 Liberty St., New York City.

W. Bampfield, General Manager, Central District and Printing Telegraph Co., Pittsburg, Pa.

Ephraim Banning, Counsellor at Law, 225 Dearborn St., Chicago, Ill.

Wm. Edgar Banta, Horologist and Inventor, 40 West Main St., Springfield, O.

Alexander Graham Bell, Inventor of the Telephone, Washington, D. C.

Chas. J. Bell, President, American Security and Trust Co., Washington, D. C.

Herbert D. Bennett, Vice-President, National Time Register Co., Columbus, O.

Henry Bentley, Electrical Engineer, Cor. Walnut and Morton Sts., Germantown, Philadelphia, Pa.

Emile Berliner, Inventor, Columbia Road, Washington, D. C.

Geo. N. Bierce, Secretary, Stillwell & Bierce, Manufacturing Co., Turbines and Mill Machinery, 221 W. Monument Ave., Dayton, O.

C. E. Billings, President, The Billings and Spencer Co., Hartford, Conn.

Harry H. Blades, 418 Cass Ave., Detroit, Mich.

H. M. Boies, President, The Bois Steel Wheel Co., Nos. 2 and 3 Commonwealth Bldg., Scranton, Penn.

L. L. Bond, Attorney and Counsellor at Law, 1147 Monadnock Bldg., Chicago, Ill.

James H. Bonsack, 1326 Chestnut St., Philadelphia, Pa.

Dr. W. G. A. Bonwill, 2009 Chestnut St., Philadelphia, Pa.

Adolphus Bonzano, Vice-President and Chief Engineer, The Phoenix Bridge Co., 331 S. 18th St., Philadelphia, Pa.

John Bowles, Manager, Saw and Planer Co., 39 West 26th St., New York City.

Cyrus F. Brackett, Professor of Physics, College of New Jersey, Princeton, N. J.

W. H. Bristol, Assistant Professor of Mathematics, Stevens Institute of Technology, Hoboken, N. J.

A. T. Britton, Pacific Building, Washington, D. C.

Frederick B. Brownell, Manufacturer of Street Cars, 2300 N. Broadway, St. Louis, Mo.

Charles F. Brush, The Arcade, Cleveland, O.

Charles L. Burdett, Attorney and Counsellor at Law, 26 Pratt St., Hartford, Conn.

Asa S. Bushnell, President, The Warder, Bushnell & Glessner Co., Manfacturers Champion Mowing and Reaping Machines, Springfield, Ohio.

Wm. Butterworth, Moline, Ill.

Alex. S. Capehart, Editor The Inventive Age, Washington, D. C.

G. J. Capewell, Inventor and Manufacturer, Hartford, Conn.

O. Chanute, Consulting Engineer, 413 E. Huron St., Chicago, Ill.

F. J. Clamer, Metallurgist, 46 to 52 Richmond St., Philadelphia, Pa.

Frank H. Clark, Manager, Middle Atlantic District General Electric Co., 1333 F St., N. W., Washington, D. C.

G. S. Clark, Supt., Fidelity Insurance, Trust and Safe Desposit Co., 325-331 Chestnut St., Philadelphia, Pa.

J. G. Claud-Mantle, Mechanical Engineer, 55 Richmond St., Brooklyn, N. Y.

Asa S. Cook, Manufacturer, Hartford, Conn.

L. C. Crowell, R. Hoe & Co., 504 Grand St., New York City.

A. F. Cushman, President, Cushman Chuck Co., Hartford, Conn.

J. C. Cushman, Manufacturer, 1015 Rookery Bldg., Chicago, Ill.

Augustus Day, Inventor and Manufacturer, Railway Track Cleaner, 73 State St., Detroit, Mich.

Geo. H. Day, Vice-President, Pope Manufacturing Co., Hartford, Conn.

Philip T. Dodge, Lawyer and Manufacturer, Tribune Bldg., New York and Loan and Trust Building, Washington, D. C.

William Castle Dodge, Patent Attorney, 700 9th St., N. W., Washington, D. C.

Julian C. Dowell, Patent Attorney and Counsellor at Law, Washington Loan and Trust Bldg., Washington, D. C.

Geo. Draper & Sons, Cotton Machinery, Hopedale, Mass.

A. N. DuBois, Analytical Chemist, 2718 East, Alleheny Ave., Philadelphia, Pa.

James T. DuBois, Inventive Age Bldg., Washington, D. C.

R. G. DuBois, Patent Attorney, Inventive Age Bldg., Washington, D. C.

F. Ecaubert, Machinist, 60 Rose St., New York City.

Geo. F. Eisenhardt, Mining Engineer, 1306 Howard St., Philadelphia, Pa.

Irving Elting, Patent Attorney, 54 and 56 Market St., Poughkeepsie, N. Y.

Theodore N. Ely, Civil Engineer, General Superintendent Motive Power Penn. R. R., 233 S. 4th St., Philadelphia, Pa.

Stephen H. Emmens, Amador City, California.

R. H. Ensign, Manufacturer, Simsbury, Conn.

E. A. Eversman, Cor. Broadway and Logan, Sts., Toledo, O.

Jas. L. Ewin, Solicitor of Patents, 900-902 F St., N. W., Washington, D. C.

Thomas Ewing, Jr., Solicitor of Patents, 41 Wall St., New York City.

John M. Fairfield, General Manager, American Writing Machine Co., Hartford, Conn.

Jacob Felbel, Solicitor of Patents, 206 Broadway, New York City.

H. N. Fenner, Treasurer, New England Butt Co., 31 Pearl St., Providence, R. I.

Francis Forbes, Farmer and Lawyer, 34 Nassau St. New York City.

A. C. Fowler, Patent Lawyer, Bank of Commerce Building, St. Louis, Mo.

Arthur C. Fraser, Solicitor of Patents, Temple Court, New York City.

Daniel Frazer, Photo-Lithographer, 458-460 Pennsylvania Ave., Washington, D. C.

A. French, Manufacturer of Springs, A. French Spring Co., Pittsburg, Pa.

Geo. Frost, Manufacturer, 31 Bedford St., Boston, Mass.

Robert M. Fryer, Consulting Engineer, 911 G St., N. W., Washington, D. C.

Jacob Fulmer, Locomotive Engineer, 84 Depot St., Ashville, N. C.

Joseph D. Gallagher, Lawyer 765 Broad St., Newark, N. J.

Richard Henry Gatling, Counsellor at Law, 229 Broadway, New York City.

Dr. R. J. Gatling, Inventor of Fire Arms, Hartford, Conn.

Geo. W. Gregory, Patent Solicitor, 34 School St., Boston, Mass.

John H. Hall. Vice-President and Treasurer, Colts Fire Arms Manufacturing Co., Hartford, Conn.

Andrew S. Hallidie. Civil and Mechanical Engineer, President, California Wire Works, Inventor Cable Railway System, 9 Fremont St., San Francisco, Cal.

Fred Happersberger, Manufacturer of Tools and Specialties for Watchmakers and Jewelers, P. O. Box 287, Toledo, O.

Geo. Harding, Counsellor at Law, 901 Walnut St., Philadelphia, Pa.

Wm. H. Hart, President, The Stanley Works, New Britain, Conn.

Edward B. Hatch, Secretary, The Johns-Pratt Co., Hartford, Conn.

Will L. Hayes, Asst. Supt., Wire Department Cleveland Rolling Mill Co., Cleveland, O.

A. H. Henderson, General Manager, The Ries Electric Traction and Brake Co., Drexel Bldg., Philadelphia, Pa.

F. Benedict Herzog, Ph. D., President, Herzog Teleseme Co., 30 Broad St., New York City.

Charles M. Higgins, Manufacturer of Drawing Inks, 168 8th St., Brooklyn, N. Y.

B. B. Hill, Manufacturer, 1020 New Market St., Philadelphia, Pa.

L. G. Hine, Washington, D. C.

Nelson Hiss, Vice-President, Elevator Mfg. Co., 6 E. Lexington St., Baltimore, Md.

Herman Hollerith, Tabulatory Machines, Georgetown Railway Power House, Washington, D. C.

Hubert Howson, Attorney at Law, 38 Park Row, New York City.

Gardiner Greene Hubbard, 1328 Conn. Ave., Washington, D. C.

John Hyslop, Jr., Nail Manufacturer, Abington, Mass.

Albert L. Ide, Engine Builder, Springfield, Ill.

F. M. Jaquith, Mechanical Engineer, Vice-President, Reading Screw Co., 2720 Hope St., Philadelphia, Pa.

Marshall H. Jewell, Editor The Inventive Age, Washington, D. C.

Pliny Jewell, Manufacturer, Hartford, Conn.

Walter Johnson, Examiner of Interferences, U. S. Patent Office, 918 M St., N. W., Washington, D. C.

W. J. Johnston, Publisher, The Electrical World, 253 Broadway, N. Y.

Fred B. Jones, Manufacturer Railway Supplies, 110 Ontario St., Chicago, Ill.

A. Q. Keasbey, Attorney, Prudential Building, Newark, N. J.

John F. Kingsley, Mechanic and Inventor, Athens, Bradford Co., Pa.

W. R. Kinnear, President, Kinnear & Gager Steel Ceiling Co,, 240 N. 4th St., Columbus, O.

Geo. W. Kirkpatrick, President, Bickford & Huffman Co., Mfgs. Grain Drills, Macedon, N. Y.

Charles H. Land, Dentist, 271 Woodward Ave., Detroit, Mich.

Geo. M. Lane, Electrical Engineer, Asbury Park, N. J.

J. S. Lawrence, Dealer in Real Estate, 617 14th St., N. W., Washington, D. C.

S. F. Leake, President, Leake Pneumatic Transportation Co., 109 S. Broad St., Philadelphia, Pa.

James P. Lee, Inventor of Military Arms, Care Pratt & Whitney Co., Hartford, Conn.

Sylvanus D. Lock, Manufacturer Automatic Binding Harvesters, Hoosick Falls, N. Y.

Thos. D. Lockwood, Advisory Electrician, American Bell Telephone Co., 125 Milk St., Boston, Mass.

Walter S. Logan, Lawyer, 58 William St., New York City.

C. K. Longenecker, Mechanical Engineer, and V. P. and Supt., Weston Engine Co., Painted Post, N. Y., 126 Liberty St., New York City.

Harry R. Mason, Mechanical Engineer, Mason Air Brake and Signal Co., Chicago, Ill.

Geo. C. Maynard, Electrical Eingineer, 800 H St., N. W., Washington, D. C.

Wm. McClave, Manufacturer of Grates and Blowers for Boiler Furnaces,301 Seventh St.,Scranton,Pa.

E. D. Mellen, Soap Manufacturer, 184 Broadway, Cambridgeport, Mass,

Geo. B. Miles, Inventor and Printer 619 F St., N. W., Washington, D. C.

D. K. Miller, Mechanical Engineer, 420 Library St., Philadelphia, Pa.

Lewis Miller, Manufacturer, Akron, Ohio.

John Murray Mitchell, Counsellor at Law, 35 Wall St., New York.

E. Kennard Mitting, Technical Chemist, 416 Huron St., Chicago, Ill.

A. W. Montgomery, Superintendent, American Manufacturing Co., Bagging & Cordage, 16 Exchange Place, New York City.

A. J. Moxham, Engineer, President, The Johnson Company, Johnstown, Pa.

R. S. Munger, Vice-President, Northington-Munger Pratt Company, Birmingham, Ala.

John W. Noble, Rialto Bldg., St. Louis, Mo.

Edwin Norton, Machinery Manufacturer, 36–46 River St., Chicago, Ill.

Alonzo W. Paige, President, Paige Iron Works, 26 Ontario, St., Chicago, Ill.

Myron M. Parker, 1418 F St., Washington, D. C.

Henry V. Parsell, Photo-Lithographer, 458–460 Penn. Ave., Washington, D. C.

J. Russell Parsons, care Walter A. Wood, Mowing and Reaping Machine Co., Hoosick Falls, N. Y.

Frank J. Patterson, Vice-President, The National Cash Register Co., Dayton, O.

Frederick J. Patterson, Gen. Manager, American Promotion Co., 449 The Rookery, Chicago, Ill.

John H. Patterson, President, The National Cash Register Co., Dayton, O.

Pressly C. Patterson, Civil Engineer, box 83, Cambridge, O.

Daniel W. Pedrick, Mechanical Engineer, 1001 Hamilton St., Philadelphia, Pa.

Eugene Peters, Photo-Lithographer, 458-460 Penn. Ave., Washington, D. C.

Henry R. Plimpton, Inventive Experimentalist, 144 Warren Ave., Boston, Mass.

L. B. Plimpton, President, The Plimpton Manufacturing Co., Hartford, Conn.

Albert A. Pope, President, Pope Mfg. Co., Columbia Bicycles, 221 Columbus Ave., Boston Mass.

Geo. Pope, President, The Hartford Cycle Co., Hartford, Conn.

Robt. P. Porter, Comptroller, Mutual Reserve Fund Life Association, Broadway & Duane St., New York City.

F. A. Pratt, Engineer and Manufacturer, The Pratt & Whitney Co., Hartford, Conn.

Rufus N. Pratt, Valve Manufacturer, Hartford, Conn.

E. E. Quimby, Expert in Patent Cases, 59 Liberty St., New York City.

C. F. Quincy, Treasurer, The Q. & C. Co., Manufacturers Railway Specialties, 702-707 Western Union Bldg., Chicago, Ill.

C. W. Raymond, Manufacturer Clay Working Machinery, Dayton, O.

Henry A. Reed, Manager Bishop Gutta-Percha Co., 420-426 East 25th St., New York City.

Leonard F. Requa, General Manager Safety In-

sulated Wire Co., 234 W. 29th St., New York City.

John V. Rice, Jr., Mechanical Engineer, Edgewater Park, N. J.

Francis H. Richards, Mechanical Engineer, Inventor and Expert in Patent Cases, Hartford, Conn.

Elias E. Ries, President and General Manager, The Ries Electric Speeialty Co., cor. Baltimore and Eutaw Sts., Baltimore, Md.

Ezra H. Ripple, Scranton, Pa.

Henry Roberts, President, Hartford Woven Wire Mattress Co., 59 Lafayette St., Hartford, Conn.

Wm. F. Roberts, Printer and Engraver, 1421 G St., N. W., Washington, D. C.

Wm. Roemer, Manufacturer of Traveling Bags, 265-277 Broome St., Newark, N. J.

Charles E. Ross, Mechanical Engineer, 347 Kerlin Ave., Chester, Pa.

P. L. Salmon, Secretary., Steam Guage & Lantern Co., Syracuse, N. Y.

Benjamin Scarles, Inventor and Mechanical Expert, Clinton, Mass.

J. H. Schnarrenberger, Mechanical Engineer, 47 Gotwald Bldg., Springfield, O.

Charles T. Schoen, President, Schoen Manufacturing Co., Pressed Steel Specialities, 912 Betz Bldg., Philadelphia, Pa.

G. H. Schulte, Superintendent, Milwaukee Harvester Co., Milwaukee, Wis.

Walter Scott, Traveler and Inventor, Hoosick Falls, N. Y.

C. W. Seamans, President., Union Typewriter Co., 1267 Pacific St., Brooklyn, N. Y.

Col. F. A. Seely, Examiner, U. S. Patent Office, Washington, D. C.

Lemual W. Serrell, Solicitor of Patents, 140 Nassau St., New York.

Thomas Shaw, Mining Engineer, 915 Ridge Ave., Philadelphia, Pa.

G. Witherell Sherman, Inventor and Manufacturer Musical Instruments, Lynbrook, N. Y.

F. E. Sickles, National Water Works, Kansas City, Mo.

William E. Simonds, Potter Bldg., New York City.

Howard T. Simons, Manufacturer, Cambridge, Ohio.

Dwight Slate, Manufacturer of Machinery, Hartford, Conn.

L. La Rue Smith, Secretary, Smith Pneumatic Transfer & Storage Co., 218 La Salle St., Chicago, Ill.

Lyman Smith, President, Smith Pneumatic Transfer & Storage Co., 218 La Salle St., Chicago, Ill.

R. Tynes Smith, Manufacturer of Cans, cor. Mill and Bowly Sts., Baltimore, Md.

Wm. John Smith, Manager, Geometric Drill Co., 698 Chapel St., New Haven, Conn.

I. J. Steane, President, The Barbour Silver Co., Manufacturers of Plated Ware, Hartford, Conn.

Arthur Steuart, Lawyer, 213 E. German St., Baltimore, Md.

Norman C. Stiles, 36 Pleasant St., Middletown, Conn.

Francis H. Stillman, Machinery Manufacturer, 204-210 E. 43d St., New York City.

Marvin C. Stone, Manufacturer of Patented Novelties, 430 9th St., N. W., Washington, D. C.

John H. Stonemetz, Manufacturer, Box 1022, New York City.

Charles S. Tainter, Inventor of the Graphophone, 1843 S St., N. W., Washington, D. C.

Frederick D. Taylor, Secretary, Sigourney Tool Co., Hartford, Conn.

Judge Robert S. Taylor, Attorney at Law, Fort Wayne, Ind.

Nikola Tesla, Electrician, 35 South Fifth Ave,, New York City.

William Thomas, 430 9th St., N. W., Washington, D. C.

Elihu Thomson, Electrician, General Electric Co., Lynn, Mass.

A. W. Van Dorsten, 902 F St., N. W., Washington, D. C.

Fred T. Vauz, Director, The Adams & Westlake Co., Manufacturers Railway Supplies, Chicago, Ill.

A. S. Vogt, Mechanical Engineer, Penn. R. R., Altoona, Pa.

Alfred J. Vollrath, Electrical Engineer, 420 Drexel Bldg., Philadelphia, Pa.

Wesley Wait, Dentist, 36 Smith St., Newburg, N. Y.

L. Warfield, Vice-President, Detroit Electrical Works, Detroit, Mich.

B. H. Warner, President, Board of Trade, Washington, D. C.

Addison G. Waterhouse, Electrical Works, 302 Asylum St., Hartford, Conn.

J. Elfreth Watkins, Director, Department of Industrial Arts, Field Columbian Museum, Chicago, Ill.

Wm. H. Watrous, Manufacturer of Plated Ware, Hartford, Conn.

D. G. Weems, Room 283, 145 Broadway, New York City.

Fred C. Weir, President, Weir Frog Co,, Cincinnati, Ohio.

Seth Wheeler, President, A. P. W. Paper Co., Albany, N. Y.

A. W. C. Williams, Manufacturer, Hartford, Conn.

Harry R. Williams, Solicitor of Patents, 274 Main St., Hartford, Conn.

Ward W. Willits, Manufacturer Railway Specialties, 110 Ontario St., Chicago, Ill.

Joseph R. Wilson, Manufacturer, 915 Ridge Ave., Philadelphia, Pa.

James E. Woodbridge, Manufacturer, Hartford, Conn.

Dr. W. E. Woodbridge, 450 Penn. Ave., Washington, D. C.

J. H. Woodward, M. D., Professor, Electro-Therapeutics in Cotner University, Seward, Neb.

Albert E. Woolf, Electrician, 865 Lexington Ave., New York City.

Wm. Zimmerman, Attorney and Connsellor in Patent Causes, 164 Dearborn St., Chicago, Ill.

*Manufacturing Industries.

The first definite information concerning the magnitude of the manufacturing industries of the United States is contained in the Federal census of 1820. The totals for these manufactories for the year ending May 31st 1890 show 355,415 establishments employing 4,712,622 hands on an average each day of the year and producing a product valued at $9,372,437,283. The only industry, excepting those classed as mechanical or manufacturing, that increases the wealth of the country by enhancing the value of raw material in changing its form, is agriculture. The total value of all farm products for the same year is given as $2,460,107,454 or about one-fourth of that shown for manufactures. No other comparison can so clearly show the magnitude and importance of our manufactures.

The locality in which the manufacturer can obtain his raw material the cheapest and in which he can earn the greatest return to his capital will be the point around which factories will cluster and where the population will center. Taking the totals for 165 cities it appears that the capital required for a product valued at $100 is $63.66, while in the districts outside the cities it is $81.72. The capital required for a product of a given value in the rural districts exceeding that in the cities by $18.06. The cost of a product of $100 in the cities is shown to be as follows: wages $24.97, miscellaneous expenses $7.24 and materials $58.57, total $85.78. For a product of the same value in the rural districts wages are $23.13, miscellaneous expenses $5.70 and materials $58.14, the total cost being $86.97 and exceeding that for the cities by $1.19. The principal difference is found in the cost of materials, the cost of materials shown for the rural districts exceeding that for the cities by $4.57. On the other hand the proportional cost of wages in the cities exceeds that in the country by $1.84. The average annual earnings per employe in the cities is $491.26, while the average paid by manufacturers outside the cities is $370.95. The average annual earnings paid in the cities exceeding those for the rural districts by $120.31. It appears that the manufacturer located in the cities is able to turn out his product at less cost, earn a better return to his capital, and pay higher wages than the establishment located outside of the cities.

The establishments located in the cities report 67 per cent of the total product for the United States. In the large majority of industries the establishments in the cities are larger and report a product that exceeds in value that for the entire country outside of the cities. In the manufacture of agricultural implements for instance, there were 195 establishments reported for the cities as compared with 715 outside of the cities, but the establishments in the cities report 55 per cent of the total product and the average establishment reports a capital of $429,685; 111 employes and a product of $227,010, while the average establishment in the rural districts reports only $86,049 as capital, 29 employes and a product valued at $51,755. The employment of females in the manufactories of the cities is more general than in the rural districts. The proportion that the different classes are of the aggregate employes in the cities is as follows: males 77.41 per cent, females 20.49 per cent, and children 2.10 per cent. In the rural districts the males are 82.80 per cent, females 13.39 per cent, and children 3.31 per cent. The proportional number of females in the cities being 6.60 per cent greater than in the rural districts.

From 1850 to 1890 the females employed in manufactories increased 235 per cent. During the ten years from 1880 to 1890 they increased 48 per cent, while the number of children decreased in the same ratio. The largest increase in females and corresponding decrease in children is found in the states where the textile industries predominate. The average annual earnings for male operatives in the total for all classes of mechanical and manufacturing industries in the entire United States during 1890 was $498 as compared with $396 for females. Male pieceworkers earned on an average $500 during the year and females $255.

*Synopsis of an address delivered by Mr. W. M. Steuart before the National Statistical Association, November 27, 1894.

The Berliner Patent Case.

This case, upon which Judge Carpenter, of the Massachusetts United States Circuit Court, rendered a decision on the 18th ult, has attracted universal notice and much comment and has been more generally misunderstood than any other patent case which has come before the public for years. A full review of the case is at this time unnecessary and we simply refer to a few salient points.

The Berliner patents are owned by the American Bell Telephone Company and the whole course of the trial and the decision of the court have been characterized by an evident spirit of antagonism against that corporation and "unjust monopoly" and a determination to protect the public, not simply from an unreasonable extension of the rights granted to Berliner, but from all alleged unfair dealing on the part of the Bell Company. Had the patent belonged to Berliner or any individual citizen, in all probability the suit would never have been instituted.

The Government attacked the patent on two grounds:

1. That the issue had been fraudulently delayed by the American Bell Telephone Company working through various proceedings of the Patent Office.

2. That a patent substantially covering the same invention, was issued to Berliner in 1880.

Judge Carpenter decided in favor of the government on both points.

Berliner's application lay in the office through the administrations of seven Commissioners. Up to the day before its date its issue was barred by interference with the notorious Drawbaugh case. This interference neither the Commissioner, the Secretary of the Interior, nor any one else had any power under the law to dissolve. The attorneys for the Bell Company were constantly urging the Patent Office officials to hasten action. Judge Carpenter's decision declares they were guilty of fraud because they did not *compel* them to move faster and, on this ground, decides that their patent is void.

A decision on this point made many years ago by Justice Clifford of the U. S. Supreme Court, declared that an inventor is not responsible for delays in the office, but this precedent seems to have been overlooked or ignored in this case.

Judge Carpenter's decision that the Berliner patent of 1891 is anticipated by the Berliner patent of 1880 is a discovery which none of the numerous examiners and lawyers who have studied the question for ten years, ever made. It is by no means certain that his decision will stand. The case has been carried to the Massachusetts Court of Appeals and will in all probability be eventually passed upon by the Supreme Court. If Judge Carpenter has correctly construed the law, inventors will be placed on very dangerous ground, inasmuch as any delay or neglect on the part of their attorneys will render their patents void.

One point in the present case should not be misunderstood by interested parties. The Berliner patent has not been canceled. The decision merely expresses the opinion that it ought to be canceled but, until the question is finally settled by higher courts, the Bell Telephone Company has the right to operate under it and other parties can infringe it only at their own risk.

An apparatus for burning coal dust has been invented and brought out in Germany. It is stated that the consumption of even the most inferior class of coal dust is attended with no smoke, while the heat produced is so intense that the apparatus has been adapted in Berlin to smelting works, and with excellent results. The gases as analyzed contain 9.8 per cent carbonic acid, 1 per cent air, 79.2 per cent nitrogen.

Mr. JAMES H. GRIDLEY, Manager for Munn and Company of this city for the past twenty-six years, died very suddenly, at his residence 215 F street, on the 25th ult. He started out for a drive in the afternoon with a spirited horse, and it is supposed that in holding him, he burst a blood vessel, and died at nine o'clock the same night. Mr. Gridley was one of the most respected citizens of Washington, and was quite prominent in the Masonic fraternity, and a man who was greatly beloved by those who knew him best.

THE models for the Smith Automatic Car Fender, which was illustrated in the June number of THE INVENTIVE AGE, were made by the firm of Doremus & Just, 414 Eleventh St., Star Building, this city. This firm have by their reliability established for themselves one of the largest businesses in Washington, not only in model making but as manufacturers of patented novelties and electric supplies as well.

Some of the highest medical authorities hold that pork is a frequent cause of cancer. They point to the fact that the Israelites, who deny themselves of this kind of meat, are never troubled with cancer.

NEW PATENTS FOR SALE.

Advertisements inserted in this column for 20 cents a line (about 7 words) each insertion. Every new subscriber sending $1.00 to THE INVENTIVE AGE will be entitled to the AGE one year and to five lines three times FREE. Additional lines or insertions at regular rates.

FOR SALE.—Patent No. 511,048, Work Bench for Saloons, outright, or on royalty. Something new. A chance for manufactnrers or capitalists to make good interest on their money. Print and specification to intending purchasers. Charles E. Groves, Seneca Co., Attica, O. 1-3

FOR SALE.—Patents No. 420,639 and 420,640; Railway Track Cleaners for street railways, and one for use on a locomotive to clean what the pilot passes over. Reason for selling is my age and desire to retire from business; have made track cleaners for past 22 years and will sell present business which is well established. No speculators need apply, but men wanting a good business. Address, Augustus Day, 73 State St., Detroit, Mich. 1-3

FOR SALE.—I would like to sell my patent No. 472,855, for automatically draining the condensation from slide valve engines and pumps without loss of steam. Just the thing for locomotives and traction engines. For further information, address, R. P. Capwell, Linden, Genesee Co., N. Y. 1-3

FOR SALE.—My patent No. 505,333 in U. S., and 45,619 in Canada, on Road Cart. Guaranteed to be a good rider, good looker and free from horse motion. Send for cut of cart. Jacob S. Shoemaker, New Lothrop, Mich. 1-3

FOR SALE.—Another state, South Dekota, and 45 counties in Iowa, just sold for my rocking churn, for $3,200, to C. O. Hall, of Conway, Ia. Patent No. 512,628; other territory for sale; agents wanted; best churn on market. Address Col. G. H. Smith, Webster, W. Va. 1

FOR SALE.—Patent No. 499,996; Recepticle for Growing Plants; simple, cheap, durable and ornamental. Especially adapted to big plants which can be transplanted or transported without trouble. Here is something of valne. Patents in United States, England and Germany. Write to me for particulars. Carl Hoffman, 818 Mill St., Roseburg, Oregon. 1-3

FOR SALE.—A valuable patent, No. 520,532. A device for connecting hay rakes and loader with wagons. Will sell the entire patent or State rights. Address, Marcellus Mann, Clearfield, Iowa. 12-2

FOR SALE.—Patent No. 518,934 issned May 1, 1894. "Vent Attachment" for pump pipes. Can be placed upon thousands of driven wells in this country. Prevents pipes from freezing. A sure thing; no experiment. Retails at 50c—500 per cent profit. Now is the time. All rights for sale. Address, L. Adams, Atlanta, N. Y. 12-2

FOR SALE.—Entire right in patent No. 527,957, Duplex Injector Burner. This invention is worthy of the attention of capitalists. Investigate it. Address, T. P. Evans, National Military Home, Ohio. 12-2

FOR SALE.—W. W. King of Lewistown Mo., has a few States yet to dispose of either by State or on royalty of his highly successful Flood Fence, mostly eastern States. Here is a good opportunity for some-one 12-2.

FOR SALE.—Patent Weight Door Lock without a spring; the only successful weight lock on earth. Address, David F. Reinhard, Mt. Carmel, Ill. 12-2

FOR SALE.—Outright or State rights, patent No. 520,774, dated June 5, '94. Callers' Register; an invention of merit, practical and very useful; or would correspond with competent salesmen to sell State rights. Address, Lawlor & Co, Joliet, Ill. 12-2

FOR SALE.—Or trade, Patent No. 524,065, issued August 7, 1894, on Journal Bearing, being a simple mechanism comprising an upper and lower member, the latter being provided with recesses for retaining balls, yieldingly supported therein for the shaft to rest upon. Undoubtedly the best journal bearing ever devised. A good opportunity for some one; sale or trade. Address, Daniel I. Lybe, Sidney, Ia. 11

FOR SALE.—Patent No. 454,254, on toy belonging to the "puzzle" family. A fine opportunity for some person or novelty manufacturer. Only $180 and royalty if taken at once. Max Cohn, 828 Vliet St., Milwaukee, Wis.

FOR SALE.—Cheap: the patent on Fence Building Tool—all east of the Mississippi river. It is a combination post hole digger; the handiest tool out. Write for particulars to J. W. Brennaman, Abilene, Kansas. 11-tf

FOR SALE.—Two recent valuable patents for Illuminated Revolving Day and Night Store Window Advertising Apparatus practical for introducing and pushing any kind of business, especially in the way of novelties. Owing to pressure of other business patentee will dispose of both patents at a very small price. Address, the sole owner and patentee, S. Kuh, Sioux Falls, South Dakota.

FOR SALE.—New Improved Sash Balance, patented July 4th, 1893; No. of patent 500,967. Will sell or manufacture on royalty plan. For further information, address the inventor, Joseph H. Shipman, Whippany, Morris Co., N. J. 1-3

FOR SALE.—Patent No. 521,053, June 5th, '94. A Fish and Game Trap; state rights for sale cheap, the best all purpose trap ever invented. Address, Wm. Seaton, inventor and patentee, Greenfield, Painsett Co., Ark. 12-2

FOR SALE.—County and State rights, Johnston's Storm Sash and Outside Shutter Fastener. Address, J. D. Johnston, Newport, R. I. 1-4

BUSINESS SPECIALS.

Advertisements under this heading 20 cents a line each insertion—seven words to the line. Parties desiring to purchase valuable patents or wanting to manufacture patented articles will find this a valuable advertising medinm.

WANTED.—Small articles to manufacture on royalty; must be meritorious and in popular demand. Give full particulars of patent with stamp for reply. G. W. McCoole, 720½ Pine St., St. Louis, Mo. 1-3

WANTED.—Will pay for patenting meritorious inventions of small articles in the U. S., provided, a preliminary examination has been made. If that has not been done $5 must accompany the application. Address, M. L. Schoch, 2810 N. Broad St., Phila., Pa. 12-2

TO EXCHANGE, Property and money for small inexpensive and easily manufactnred patent, mailable article preferred, Address, Ira Lutes, Cairo, Ill. 12-2

WANTED.—To buy a patent, or will take the agency, must be small, practical and useful, give full particulars or no notice taken. Address, "Cash," Inventive Age. 12-2

WANTED.—I want $50 for one year to pay remaining fees on a valuable patent just allowed. I will give for this one-tenth of the proceeds from the invention and also return the money with interest. I have a good working model. It is inexpensive to build and worth ten times its cost. Business confidential. Address, E. W. Barton, Windsor, N. Y. 1-3

Electric Flashes.

Berlin and Vienna are now connected by telephone.

The last annual report of the Western Union Telegraph company presents some interesting figures. The average toll per message for 1894 was 30½ cents and the average cost for messages was 23 3-10 cents, leaving a net profit of a little over 7 cents per message.

It is claimed a deal has been made whereby the Electric Storage Battery Company, of Philadelphia, has gained control of all former competitors in the business of supplying storage batteries, which puts an end to litigation over patents. The capital stoek has been increased to $13,500,000.

The long-distance telephone lines of the American Telephone and Telegraph Company now cover a territory included between Madison, Wis., on the West, Waterville, Me., on the East, Marinette, Wis., on the North, and Washington, D. C., on the South. Over 2,000 towns are connected by metallic circuit lines with this long-distance system.

The efficacy of treating persons shocked by dangerous currents of electricity just the same as a drowned person, has been proven in the case of an employe of the Stanley Manufacturing company of Pittsfield, Mass., who was recently struck down by a current under a pressure of 4,500 volts. He was to all appearances dead, yet was revived in a few minutes by artificial respiration. These facts and directions should be borne in mind by all persons handling or dealing with high pressure currents.

Attorneys Disbarred.

The following is a list of attorneys who have been disbarred from practice before the U. S. Patent Office or any other bureau in the Interior Department. INVENTIVE AGE readers who have positive proof of unprofessional or fraudulent practices on the part of other attorneys will confer a favor on the inventors of the country if they will communicate the facts to the INVENTIVE AGE:

Wesley Flanagan, Jamestown, Ky.; Charles D. G. McKay, Port Alleghany, Pa.; M. D. Ellis, Worthington and Indianapolis, Ind.; H. Norman McIntire, Washington, D. C.; B. J. Donnell, Shelby, Miss.; Lewis F. Houpt, Buffalo, N. Y.; F. H. Barker, Kansas City, Kans.; John S. Chapman, New Haven, Conn.; James Cooley, Richwood and York, Ohio; C. A. D. Hill alias Albert D. Hill, Pensacola, Fla.; Henry I. Lord, Biddeford, Maine; Wilford H. Smith, Greenville, Miss.; Samuel M. Cecil, Traveller's Rest, Ky.; J. S. Armstrong, Xenia, Ohio; A. F. Posey; Vicksburg, Miss.; Thos. Caldwell, Chetopa, Kans.; B. F. Brown, Pittsburg, Pa.; William H. Kerr, Salineville, Ohio; Vincent Anderson, Quincy, Ind.; L. W. Scheurman, Hudson, Ohio; Samuel J. Brown, Philadelphia, Pa.; Richmond Wiseheart, New Castle, Ind.; Jesse C. Hamel, Hoboken, N. J.; Samuel R. Yorst, South Bethlehem, Pa.; Lemuel C. Reeves, Burlington, N. J.; George W. Dearing Jr., New Orleans, La.; U. T. S. Rice, Mattoon, Ill.; William J. Hutchins, Wichita, Kans.; William A. Phelps, Richwood, Ohio. Shipley Brashers, Washington, D. C.

READ extraordinary premium offers in this issue—good to old subscribers renewing for another year as well as to new subscribers.

Aftermath.

The Cable railway on the Brooklyn bridge carried nearly 42,000,000 passengers last year.

—

It is claimed that a slight flow of natural gas has been struck in Lincoln county, Oklahoma.

—

Fires have been started in the furnaces of the Watts steel plant at Middlesboro, Ky., and 500 men will be given employment.

—

Ex-Governor Oden Bowie, of Maryland, who died last month, was president of the City Passenger Railway Co., the oldest street car company in Baltimore.

—

The Provisional Ship Canal Company of Pittsburg, Pa., has started a subscription fund for the purpose of building a canal from that city to the Great Lakes.

—

The government has accepted the new cruiser "Minneapolis" from the Cramps, subject to the five months efficient service provision and paid the speed premium of $414,600.

—

The cut in prices of steel rails to $22 a ton at Pittsburg and $23 at Chicago, is expected to give an impetus to renewal of rails on many tracks now in dangerous condition.

—

The Ontario Malleable Iron Works at Oshawa, Ont., were totally destroyed by fire, Dec. 11. It was the oldest and most important industry of this kind in Canada. Loss, $120,000.

—

The government canal commission to select the best route for a deep-water canal between Deleware and Chesapeake bays has chosen what is termed the Back-creek route, near the line of the present canal.

—

The failure of the English firm of James Watt & Co., is announced. Additional interest attaches to this announcement because of the fact that this business was founded by James Watt, the inventor of the steam engine.

—

William E. Kelley, proprietor of the National Iron Works and president of the National Water Tube Boiler Company of New Brunswick, N. J., died suddenly of heart disease at his home, in that city, on Tuesday, December, 11.

—

The New York state engineer and surveyor has begnn the preliminary surveys on the proposed plan for the deepening of the Erie canal to a uniform depth of nine feet. The last legislatnre appropriated $100,000 as a starter for this work.

—

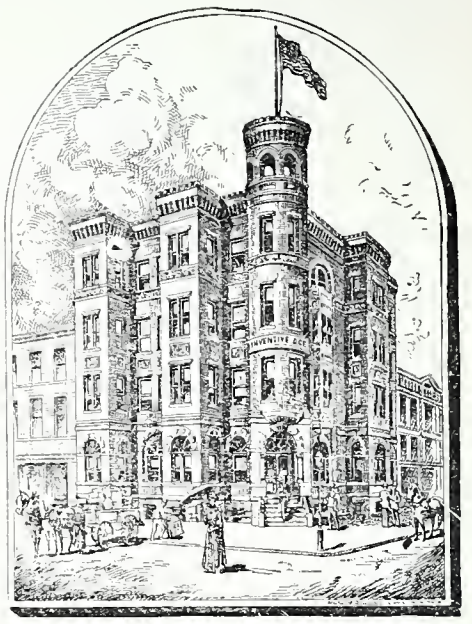
Petroleum, as a fuel for war vessels, says a foreign service journal, will be introduced into the Russian navy, by a recent order of the admiralty. The new armored cruisers "Rostislaff" and "Rossia" now building at Nicolaieff and the Baltic Iron Works respectively, will be the first vessels to be fitted with petroleum furnaces, and the liquid fuel will be fully tested in these ships before other vessels are so fitted.

—

It is only a question of time when the South will favor the American policy of protection as earnestly as the North. Even now the South Carolina Legislature has before it a measure for the encouragement of manufacturing by exempting from taxation for a period of ten years new plants that may be located in the State. As a result of this sudden awakening in business enterprise in the south the Tradesman says: "General depression in all other lines seems to have actually stimulated the southern cotton mill trade to unusual activity. We never, in so short a time as in the last month, heard of so many new mill projects, so many extensions of old plants, so many mills running two turns a day. The greater number of new mills are located in North Carolina, though several are divided among other states."

THE general tendency to reduce expenses in the handling of material is shown by the Lowell Bleachery and Dye Works, of Lowell, Mass., who are at present installing a very complete system of cars and track for handling their coal. In their boiler room they will have an especially fine equipment, as they are to lay cast plate track, which will present a very fine appearance. This railway is to be of the standard gnage, 21½ inches, furnished by the C. W. Hunt Company, of New York.

JOHN RICHARDS now editor of "Industry" and author of that excellent little work on technical education, "The Economy of Workshop Manipulation," in speaking of the "Correspondence Schools" at Scranton, Pa., says: It is the most original agency for technical edncation that has ever been devised, capable of an extension that has on visible limit, and portends a time when we will not set off a few of the most fortunate for education, but educate all up to the limits required in the application of the skilled arts. One effect will be to raise the standard of the ordinary courses in technical colleges and schools because mediocrity can be attained at a tithe of the expense and in ways more congenial to most students. The habit of writing out exercises is a good one, good in all kinds of muemonic effort, and when to this is added the interest of a communication personally addressed, and the environment of a home, it is easy to discern the attraction of a correspondence system.



INVENTIVE AGE BUILDING.

PREMIUMS TO SUBSCRIBERS.

Read the following offers to new subscribers:

OUR $1 OFFER.

THE INVENTIVE AGE one year and two copies of any patent desired, or one copy of any two patents..... $1 00

THE INVENTIVE AGE one year and a list of 50 firms who manufacture and sell patented articles..... 1 00

THE INVENTIVE AGE one year and Altograph map of the City of Washington 1 00

THE INVENTIVE AGE one year and a five line (35 words), advertisement in our "Patents For Sale," or "Want" column, three times..... 1 00

For $1.

THE INVENTIVE AGE and any one of the following Scientific books:

How to Make Electric Batteries at Home, fully illustrated, by Edward Trevert.

Everybody's Handbook of Electricity, illustrated, by Trevert.

How to Make a Dynamo, by Trevert.

Practical Directions for Electric Bell Fitting and Electric Gas Lighting, by Trevert.

Elihu Thompson's What is Electricity?

OUR $1.35 OFFER.

THE INVENTIVE AGE one year and Joseph Allen Minturn's famous book "The Inventor's Friend," indorsed by such high authorities, as Dr. Gatling, Clem Studebaker and others.....$1.35
Book alone 50 cents.

THE INVENTIVE AGE one year and any one of the popular and instructive books as per offer in another column, under heading of "Popular Scientific Books."".....$1.35

THE INVENTIVE AGE one year and any one of the "Excelsior Edition of Standard Poets," mentioned elsewhere in this magazine.....$1.35

THE INVENTIVE AGE one year and a copy of "Picturesque Washington," 260 pp., 136 illustrations, Stilson Hutchins' famous book, former price $2, sent to any address in the United States..... $1 35

THE INVENTIVE AGE one year and The Peoples' Atlas of the World, one of greatest bargains ever heard of; size of Atlas 14 x 22 open; latest maps and statistics; handsomely illustrated, a $2 book with AGE one year—both for.... $1 35

☞See another column for other offers.

OUR $1.50 OFFER.

THE INVENTIVE AGE one year and Robt. Grimshaw's famous book "Tips to Inventors"..... $1 50

Address all communications to
THE INVENTIVE AGE,
Washington, D. C.

Important to Commercial Travelers.

On and after December 1st, Baggage Agents of the B. & O. R. R. Co., will accept coupons from mileage books issued by B. & O. R. R., P. & W. R'y, B. & O. S. W. R'y and Valley R'y of Ohio, in payment for excess baggage charges, at their face valne, 2 cents each. This arrangement will not include B. & O. Mileage Books endorsed "good only on B. & O.," B. & O. Southwestern Mileage Advertising Books, nor books older than one year from date of issue. 12-1

Want a Fountain Pen?

One of the very best in the market, a standard article, warranted, will be sent as a premium with THE INVENTIVE AGE. The retail price of the pen is $2.75. We will send the AGE one year and the pen for $2.75.

THE Clayton Air Compressor Works, Havemayer Building, 26 Cortland street, New York, have sent us a copy of their newest publication on the "Uses of Compressed Air." The list cites about seventy different applications of air under pressure, and is a most convincing commentary upon modern advancement in Engineering, Manufacturing and Industrial lines. It is of especial interest to Engineers, Railroad men, Machine and Construction Shops, Granite and Marble Works, Chemical Works, Sugar Refiners, Rubber and Silk Mills, Tin Ware, Pipe and Hose Manufacturers, and to all industries who use Artesian Wells, Automatic Sprinklers, etc. The list is mailed free on application.

A CLASSIFIED list of Patents issued during the month appears in each issue of the INVENTIVE AGE, which keeps inventors posted in the art in which they are mostly interested. —— The full address of any patentee, and number of patent found below sent to any address on receipt of one 2-cent stamp. —— We will send, postpaid, to any address, printed copies of any U. S. patents, with specifications and drawings, upon receipt of 20 cents for one copy; 35 cents for two copies; 50 cents for three copies. —— (See premium offer elsewhere in this issue.) —— Address THE INVENTIVE AGE, 8TH AND H STS., WASHINGTON, D. C.

LIST OF PATENTS

GRANTED FOR INVENTIONS,
NOVEMBER 27, 1894.

Adding machine. H B Martin.
Armatures and field magnets and making same, conductor coil for. E W Alexander and H Groswith.
Armor plate. P R D D'Humy.
Auger bit. E C Phillips.
Awning and fire and burglar proof shutter, combined. W Lash.
Axle boxes, floor for car. A Lichtenheiu.
Axle washer, vehicle. M D Peckham and C E Swan.

Back brace. J Gallegos.
Bag lock. J B Bundren and J W Hedges.
Baling machine, cotton. C L Bessonett.
Baling machine, cottou. H E Smith and B A Dare.
Baling machines, core holding mechanism for cotton. H E Smitn and B A Dare.
Baling press. H E Smith.
Ballot box, registering. L M Foster.
Band cutter and feeder. C W Bond.
Barrel heads in place, device for securing. O P Gordon.
Basket making machine. E Horton.
Bearing, roller thrust. J R Burdict.
Bed, folding. T Opel.
Belt, suspensorf. E J Pike.
Bicycle. S Bramall.
Bicycle. P J Deacon.
Bicycle. J Gillingham.
Bicycle driving gear. O W Schaum anc C Alvord.
Bicycle pedals, toe clip for. C F Porter.
Bicycle rest. R J Noderer.
Bicycle stand. I I Fonda.
Billiard cue. G Gschwendtner.
Billiard cue tip. C N Briggs.
Blind, venetian. J G Wilson.
Blotter, self binding. R L Boyd.
Boat. G L Godfrey.
Boiler. J J Bohner.
Boiler furnace and boiler, steam. E D Meier.
Boiler tube or pipe cleaner. H J Lawrence and A E G Bromell.
Boot or shoe and making same, waterproof. C W Shippee.
Boot or shoe, waterproof. C W Shippee.
Boring machine, multiple. C Cristadoro.
Bottle. C H Van Wie.
Bottle. W Von Bokern.
Bottle, drenching. J T Turner.
Bottle forming machine. R T Beckett.
Bottle stopper. C B Sheldon.
Bottle washer. A R Wiens.
Brake shoe. E Cliff.
Brick kiln furnace. B W May.
Bridle bit. R A Shute.
Brooch pin. D Metzger.
Burglar alarm, detonating. L B Burrill.
Button blank forming machine. E J Pope.
Button fastener. H Thier.

Calendar, perpetual. O E Vawter.
Can bodies, etc., machine for making W H Smyth.
Can opener. J Bien.
Candy whistles, manufacture of. C E Gardiner.
Car bolster, railway. C T Schoen.
Car buffer. C A Gould.
Car, combined sleeping and parlor. L F Ruth.
Car coupling. E R Burden.
Car coupling. J Lessard.
Car coupling. H Raymond.
Car fender, street. H Grieser.
Car heater. E H Gold.
Car register, street. E Catlin and G Rein.
Carbonatiug liquids, apparatus for. H S Ferry.
Carbonating liquids, method of and means for. H S Ferry.
Carpet rolls, means for supporting. C L Taylor.
Carriage top spring. D Conboy.
Cash register. J M Heath.
Cash register. J H Voss.
Cash register and indicator. J B Aufuldish.
Casting mold. C A R Hampel.
Ceiling or floor. S G Brinkman.
Ceiling, roof or like structure. T A Lee.
Channeling machine. Z T Frence and W C Meyer.
Checking and uncheckiug device. B A Blakemore.
Cheese press. H Eeldmeier.
Chest aud bleacher, stuff. G M Newhall,
Churn. L Sturges.
Cigar bunching machine. F H Borgeldt.
Clamp and vise, combined. C F Weyhe.
Clock, musical. H W Porter.
Cloth laying machine. A Eloesser.
Clothes line fastener. C J Brown.
Clutch. friction. E D Schmidt.
Coal, stone, etc., machinery for cutting. T Heppell snd J G and W Patterson.
Coffee pot holder. C E Presne.l.
Collar and hames. combiued horse. G C Hale.
Collar stuffiug machine, horse. J Gebauer
Coloring master from logwood and making same. P T Ansten.
Column for structural metal work. E Haupt.
Combiuation wrench. W S Clay.
Coumutator brnsh for dynamos. G Forbes.
Condenser and exhaust pipe head. J J J De Rycke.
Copying apparatus, multiple. W M Williams.
Copying book. A B Turner and H A McMullen.
Cotton compress. C L and W T Bassonette.
Coupling link. W H Casey.
Cradle. M C Sorrell.
Cravat. A Hajos.
Cultivator. A W Butt.
Cultivator, corn. E R Jones.
Current generator, alternating. J E Kelly.
Cushion or mattress. H and E Brupbacher.
Cycle frame. E E Hersh.

Dental or surgical chair. A P Gould,
Distilling water, apparatus for. A J Chase.
Door fastener. H Saqui.
Door hanger. G T Buddle.
Door hanger. A T Kingsley.
Door hanger. A L Swett.
Door hanger track rail, track rail joint, and track rail bracket. M McCawley and A T Kingsley.
Doweling machine. G W Bond.
Draft attachment. C Matthews.
Drawing piu. C Muller.
Dressing case. H Widdicomb.
Drier. H Bullock and C E Ward.
Drill. D Baker.
Dust bin, dust cart, etc. F S Salberg.

Ecraseur. M McNalley.
Egg beater. C D Weeks.
Electric contactor. rotatable. J W Curry.
Electrical contact mechanism. J F Blake.
Electrical purposes, plug aud receptacle for. L J Cartwright.
Elevator cup. W F Boswell.
Elevator motor, electric. W C Fletcher.
Eud gate, wagon. L C Sweet.
Engiue brake, mining. B Yoch.
Engraving machine. C C Bruckner.
Explosive, high power. J E Blomen.
Eye glasses. double. J J Wood.

Fan, contrifugal. V D Anderson.
Fare register. A Pfaff.
Feed cutter. J K Wilder.
Fence, portable sectional. A H Cook.
Fence stay, wire. A F Dickey.
Feuce, wire. C R Pickett.
Fence wire tightener. F R Conner.
Filter. J A Bowden.
Fire extinguishing apparatus. R Tranquilli.
Fire place and ventilator combined. J W Tatem.
Fish stringing device. A H Sippy.
Floor set. N B Marston.
Floors and ceiling, coustruction of. J F Golding.
Flooring. J G Wilson.
Forge. H W Wendt.
Frame structures, exterior finish for. T Girouard.
Frame structures. machine for erecting. J Fairbank.
Fruit pitting machine. S Standish.
Funnel. C W Beall.
Furnace. N Johnsous
Fuse, multiple plasting. W J C Doyle.

Game apparatus. E C Howell.
Game apparatus. V Kobler Stauder.
Game apparatus. O Oisson.
Garment fastener. A Picken.
Gerr and governor, reversing. T T Waggoner.
Glass molding machine. R T Beckett.
Glazier's tool. G A Rogers.
Grain separator. C D Hoseltou.
Grille. B E J Eils.
Grinding mill. T L and T J Sturtevant.

Harrow, disk. G W Packer.
Harvester. E Pridmore.
Heating and ventilating rooms, device for. J Cinnamon.
Heating apparatus, box or furnace for electric. C L Coffin.
Heel pressing machine. J J Heys.
Horseshoe. J Maslen.
Hub protector for wagons. N D Hodgkins.

Inhaler. S D Ross.
Ink roller brake attachment. E Meier.
Insecticide. L and E Brumleu.
Ironing machine. D H Benjamin.

Knob attachment. T A Hodgson.
Knob attachuent. T E Wardwell.

Label and price card, combined. W P Stevens.
Ladder, step. M Miuier.
Ladders, combined brace, clamp, step fastening and support foo step. S E Allen.
Lamp and support, cycle. J C Tudor.
Lamp bracket, vehicle. S L Reefy.
Lantern. W S Hamm.
Lautern. D Jackson and J Osterloh.
Lantern. G W Jarmin.
Latch, end gate. S T Elgin.
Lawn rake. T A Galt.
Lawu rake. M S Gifford.
Leaching, machiue for pulverizing bark for. L R Johnson.
Ligature receptacle. G M Stratton.
Lightning rod ornament. C F Keys.
Line tightener. A B Frack.
Lithographic stones, clamping device for. O Roeseu.
Locking device for show cases. J M Waddel.
Locomotive drive wheels, releasing device for brakes of. W O Pelham.
Locomotives, means for supporting motors in electric. W S Adams.
Loom 4. J H Northrop.
Loom for weaviug double pile fabrics. G and F Priestley-
Loom shuttle guard. A Waddington.
Loom Jacquard mechanism. J C Liberty.

Malting machiue. A Schultz.
Mattress filling machine. E T Gaskill.
Medalliou, souveuir. S May and L M Arno. (Reissue)
Metal coatings from metallic basis, removing and recovering 3. T G Hunter.
Metal, electrically heating. C L Coffin.
Metal for blades, pipes and etc. J W Wyckoff and J M Wetton.
Metal shears. T J Thompson.
Metal straighteuing machine. W S Ralya and R Coyle.
Metal stripes on pasteboard, etc., machine for fastening. E Saltzkorn and L Nicolai.
Middling purifier. H Seck.
Milking machines, suction pump for cow. J S Jensen.
Mixer U S Mohr.
Mixing board. E E Carpenter.
Mole trap. M H Nash.
Motiou, converting reciprecatory into rotary. D Hazard.
Music leaf turner. J Flemming.
Musical instrument. W Burke.
Musical instrument, accompaniment player for. R W Lyle.
Musical instruments, key board attachment for. J D Case.
Musical instruments, tune sheet for automatic. A Amthor.

Necktie fastener. W C McDougall.
Nut lock. J Dittmann.
Nut lock. C N Meriwether.
Nut lock. G E Smouse.
Nuts, die for making lock. S D Barnett.

Oiler. G J Kranshaar.
Ore, etc., machine for crushing. F A Wheeler.
Ornamental work and making same. E Crispin.

Packing bag. B Arkell and C A Blowers.
Packing case. J Burt.
Painting compound. W Griscom, Jr.
Pantograph. A V Joseph.
Paper feeding machine. N Lux.
Pavement, metallic. E Perrody.
Paving block. I G Poston.
Pencil sharpener. R D Cody.
Phonograph cylinder holder. L B Gray.
Pianos, treble bridge for. C L O Altenburg.
Pipe joint, submarine. R Rann.
Pipe wrence. J E Wakefield.
Placket guard. P Fabisch.
Plastic composition. J Pattigler.
Plow. W A Armstrong.
Plow. G Martin.
Plow, gang. W H Holsclaw.
Powder folding machine, W A Hill.
Powder applying mechanism. H F Parker and M G Gileette.
Printing machine, bed and cylinder. J Brooks.
Printing machine, cylinder. J Brooks.
Propeller. J B Jones.
Propeller for boats, wave power. S S Smith.
Pulp, etc., apparatus for pressing or stampiug articles for wood. E Saltzkorn and L Nocolai.
Pulp stock grinding machine. F Hickman.
Pulverizer. T Parker.
Pump. A W Shidler and W P Hendrickson.
Pump, screw. W E Quimby.
Pumping mechanism for oil wells, etc. H W Pickett.
Purifier and separator, combined. E Hards and W A Woodard.

Railway, closed conduit electric. C G Burke.
Railway conduit electric. L C Pressley.
Railway crossings, electric signals for. D W Smith.
Railway, elevated. A S Pickett.
Railway, elevated. T J Shorb.
Railway signal. R Black and C M Havey.
Railway signal. C Seldon.
Railway signal. C Selden and F P J Patenall.
Railway signal, automatic. J T Carter.
Railway sigual, cable. G F Klaffky aud F Faltinowsky.
Railway supply system, electric. Z Foster.
Railway switch and car replacing mechanism combined. A S Debose.
Railway switch frog. R T Waldrep.
Railways, closed couduit for electric. F L King.
Ram, hydraulic. C B Jones J S Wetmore.
Revolver with kuife attachment. L L Picard.
Robe, towel, etc., for heating, electric. H G O'Neil.
Rock drills or broken or detached drill rods, etc., from bore holes, grab for lifting cores formed by tubular. P A Craelius.
Roof, board. J B Browulee.
Rope clamp. G M Mullen.
Rule and ruling device. G Harvey.

Safe, express messenger's. J Campbell.
Safes, electrical recording device for. R A Newlyn.
Saw tooth sharpening machine. D Hazard,
Saw tooth swaging device. D Hazard.
Sawing machine. A J Robinson.
Scaffold and scaffold clamp. J and J G McIntyre.
Scissors holder and point guard. W Chandler.
Scraper. J D Libey.
Screws into wood, machine. for driving. C L Briggs
Seal lock. W Oak.
Separator. O M Morse.
Sewing machine quilting frame. J A Parsons.
Sewing machine, sack. C E Williams.
Sewing machine trimming attachment. W G Cummins and E A Munro.
Shade holder, adjustable window. G W Everett.
Shelf hanger. D M Herman.
Shoe. B Scarinci.
Shutter, focal plane. J E Thornton and E Pickard.
Shutter, etc., rolling. J G Wilson.
Sifter, ash. F A Pearsons
Signal apparatus. electric. H E Walter.
Signaling apparatus 2. H E Walter.
Signaling system, electrical danger. W A Phillips.
Sirup cup for bottlers. G House, Sr.
Skirt. dress. M C Geldowsky.
Slate, noiseless. C F Kizer and S N Murdock.
Snow guard. J Baird.
Soil breaking machine. W H Rees.
Sole channeling and rounding out machine. G F Fischer.
Soles and other forms, machine for cutting A M Stickney.
Speed changing and reversing mechanism 2. H H Cummings.
Speed changing, reversing and stopping mecanism. H H Cummings.
Speed iudicator and alarm. G A Thompson and J F Schmadeke.
Spindle support. E Hitchon.
Spoke socket. H J Davis and J C McDaniel.
Sprocket, interchangeable. A M Snyder.
Square attachment. G W Amos.
Steam boiler. A Poggendorf.
Steam, generation of. C Baker.
Steam, generation of. W Schmidt.
Steam generator. sectional. J H I Clandon.
Strap loop. J Reed.
Street sprinkler. L C Atwood and W T Treadway.
Sulky. W J Payne.
Switchboard. L A Berthou.
Tack driving implement. C D Rogers.
Tag holder. W B McDermut.
Tag, price and cost. J D Parrott.
Telephone. A Stromberg and A Carlson.
Telephone exchauge systems, signaling apparatus for. J H Cary.
Telephone switch. E S Combs.
Thermo electric generator. H B Cox.
Thermo electric generator, sectional H B Cox.
Thill coupling. I N Bowen and T Troxel.
Ticket holder. L J Blades.
Tie plate. S F Clark.
Tire, pneumatic. F J Jenness.
Tire, shrinking or upsettiug deviee. O T Lytten.
Tool, combination. C A Salzman.
Track jack. J McMrrin.
Track laying machino. P W Patterson.
Training apparatus. S B Whitehead.
Trolley wheel. F Lepper and W Wighton.
Trolley wire support and coupling. A P Gould.
Truck. R S Rust.
Truck and bag holder, combined. J Bouse.
Truck, haud. C Lepage.
Truck, merchandise. T B Fitzpatrick.
Trunk and display tray. W P Bingham and D R Jones, Jr.
Trunk, book case, and writiug desk, combination. J J Holm.
Tubing, apparatus for the manufacture of. Z Horovsky.
Twine holder. A A Schwan.
Type writing machine. J W Schuckers.

Umbrella runner retaiuer. S S Fretz and J B Jesson.

Valve. C S Bavier.
Valve, steam engine, E L Sauer.
Valve, stop. L Schutte.
Valve, tank regulating. E W Long.
Vehicle brake. J des Georges.
Vehicle brake. B Wilcox.
Vehicles, runner attachment for. W J Le Barron.
Ventilator or chimney cap. C Franz and R T Merrill.
Vessel brake. A B Combs.
Vulcanizable compound 2. W Griscom, Jr.
Vulcanizable compounds and vulcanizing and applyiug same, compounding. W Griscom, Jr.
Vulcanized compound, hard. W Goiscom, Jr.

Wagon, dumping. J T Richardson.
Wagon dumping device. T Wright.
Wagon running gear. J L Blake.
Wagon running gear. E E Henderson.
Washing machine. M M Lord.
Water meter, proportional. C H Bacon.
Welding apparatus, ring. C L Coffin.
Well tiling coupler. J H Brown.
Wheelbarrow. H Holdsworth, Jr.
Whist table, duplicate. G S Boutwell.
Window screen. C H Dixson.
Windows. device for protecting joints of. E O Read.
Wire spacer and twister. J H Rogers.
Wood preserving compound. A D Polsgrove.
Woven pile fabric. H Hardwick.
Wrapping machine, paper. C M and H D Bartholomew.
Wrench. J Fatkin.

PATENTS GRANTED DEC. 4, '94.

Advertising or other sign. R Henderson.
Aerial navigation, apparatus for. N H Borgfeldt.
Air, apparatus for generating compressed. E C Nichols.
Air compressing device 2. W U Griffiths and N Hiedermayer.
Ale or beer condenser and cooler. J T Jones.
Animal releasing device, H Larsen,
Animal trap. M Burton and L G Beers.
Awning. E Fautenx.
Banjo bridge. A D Grover.
Battery connection. W S Doe.
Bed bottom, spring. T A Stoll.
Bell, electric. E G Worley.
Belt tightener. H P D Krueger.
Bicycle. I L Unterbrink.
Bicycle lautern lock, W A Blackeslee.
Bicycle support. A Eisman.
Bicycles, child's seat for. F A Coulson.
Bicycles or other machines, speed multiplying gearing for. J B Grueter and O Jackson.
Bilge water alarm. C Upton.
Billiard balls from iron or steel, manutacturing. K K A Christianson.
Boiler furnace. P Hodkinson.
Boilers, feed water water heater and circulator for. E Jones.
Boiler explosion [illegible] J H Crosby.
Boilers, sediment extractor for J. H. Thomas.
Bolt heading machine. J H Alker.
Bolts, strike plate for. S B Yates.
Book carrier. H T Ilner.
Bootjack. C Bisanz.
Borer with diamond bit, rotary. F [illegible] Fromholt.
Bottle. G F Kinney.
Bottle. E C Shumard.
Bottle support, nursing. F H Lowerre.
Bread raiser. L Leitch.
Bridge. J C Fenn.
Bridge gate. T J O'Brien and E J Wilson.
Bridge girder, truss. E Keating.
Bridge, scaffold, tower, etc., extensible structure for use as a. J O Oakley
Brush holder, joint. C Roeckh, Jr.
Brush machine 2. M Young.
Brush, tooth. S Zucker.
Buckle. A Steiner.
Burglar alarm. J H Lowe.
Burglar alarm, safe. J W and W D Gilstrap.
Button setting machines, tube loader for. A W Ham.

Calcining apparatus. W S Pierce.
Camera shutting mechanism. T V Jensen.
Canal, sewer, and rain gage or meter. self recording. A J Grover.
Car air brake, street. R S Judson and G D Holmes.
Car attachment. C K Sherwood.
Car brake, railway 2. W S G Baker.
Car brake, railway. A Fahrney.
Car brake, railway. G H Kinter and G D Teller.
Car brake, railway. G Rouy.
Car coupling. J C Bishop.
Car coupling. L Grunwald.
Car coupling. E R Kirby.
Car coupling. J Reel.
Car couplings, draft iron for. J Timms.
Car, dumping. W McMahon.
Car, mail and express. F Rowley.
Car fender. E B and P S Towne.
Car fender, trolley. C F Haug.
Car safety guard, street. D A Freeman,
Car starter. T C Wright.
Cars, switch operating device for tram. A C L Engstfeld.
Carpet fastener. P Eckman.
Carriage and cradle, combined child's. O Orr.
Carriage or wagon jack. S J Johnston.
Casting molten material, apparatus for. G A Goodson.
Ceiling, fireproof. J Rueben.
Ceiling plate. J W Chamberlain.
Cement, mannfacturing hydraulic. G W A Stein.
Chair. W Daniels.
Check marker. C H Coggeshall.
Cheese manufacture, making emulsions in. D H Burrell.
Chimney cowl or ventilator. M H Ingalls.
Cigar bunching machine. E Barth.
Cigar mold, end opening wooden. N Du Brul.
Circuit breaker, thermal. H Klein,
Circuit closer. H V Keeson.
Clutch, friction. J Hartness.
Coffee percolator. H Wilson.
Coffee, tea, etc., device for steaming. J F Hornberger.
Collars, machine for turning over tips of stand up. A W Cummings,
Composing stick. J A Keyes.
Condenser, vapor. A H Dunkle.
Confectionery into molds, machine for depositing. L Hirschfeld.
Core barrel, collapsible, J W Holmes.
Cornice and curtain supports, combined window. J M Hoffman.
Cottou cleaner. H Rembert.
Cotton openers, grid for. H S Houghton.
Cotton picking machine. G C Phillips.
Counting machine. S Heim.
Creamer, centrifugal. O Ohlsson.
Current motor aud operating same, alternating. L Gutmann,
Curtain fixture. S L Bergstresser and C F Mignot.
Cutter head support. A Kendig.
Dental engine, electric. J A aud B A Jeffery.
Directory post and call box. J T Field.
Diving apparatus. J D Cooper.
Door check. S Frisbie.
Door hanger. A O Thornton.
Door or shutter, fireproof. W J Giessler.
Door, sliding. L H Weaver.
Door spring and check. H W Larsson.
Doors, guide bracket and wedge for sliding. W W Holmes.
Drawbridge joint aud operating mechanism. W R Mershon.
Drawing apparatus, perspective. H Eppers.
Dynamo regulator. J Van Vleck.

Educational appliance. A Patton
Electric conversion system. L Gutmann.
Electric light fixture. H Horn.
Electric lighting circuits, service end, cut out, and switch box for. J Van Vleck.
Electric machine, magneto. J N McLeod.
Electric machiues, brush for dynamo. P J C Carron.
Electric meter. G A Sheeffer.
Electric motor, alternating. L Gutmann,
Electric switch. J M Cronin.
Electric switch. I W Ullman.
Electrical distribution with storage batteries, system of. E Kuchenmeister.
Electrometer. E Weston.
Electrometers, method of and means for operating aud controlling. C Moderegger.
Elevator. H A Johns.
Engine cross head. J Begtrup.
Eugine indicator, steam. F Lane.
Excavator dipper, scoop, or shovel. R Thew.

Excavator shovel or scoop. R Thew.
Faucet bung. D Beebe.
Feed water regulator. C B Boswoth.
Fence. R J Carr
Fence wire. E S Scofield and J J Jennings.
Fence wire. H W Vail, Jr.
File blanks, machine for stripping. A Wee..
Filter barrel. N H Cone.
Fire extinguisher. W H Moore and J Gardiner.
Fire extinguishing apparatus. H D Kramer.
Fire extinguishing apparatus. C E Manning.
Fish or crab net. M E Becker and R Lind.
Fish trap. W M McKenzie.
Flower box. A Smith.
Flue, ventilating. F Lange.
Forging metals, etc., hydraulic apparatus for. A H Tyler and J S E de Vesian.
Funnel, automatic. H I Keiner.
Furnace. G Maag.
Furnaces, means for promoting combustion in. J B Davids.
Furnaces, stoker for engine. E T McWhorter.
Gage. L O Barrett.
Galvanizing apparatus. G G McMurtry.
Garbage and similar waste products, utilizing. N B Powter.
Gas engine. T H and J T H Paul.
Gas holder. H Muller.
Glass, producing flat objects of. P Sievert.
Glassware, apparatus for cutting. J Lobet.
Grain binder knotter mechanism. M F Fairbank and J R Meach.
Grain elevator. A J Hendricks and S Forsythe.
Grain separator. P R Lanier.
Grinding machine. C H Trask.
Grip wheel. A J B Berger.
Gun, breakdown. A Balensiefer.
Gun, breakdown. M S Barker.
Gutter forming machine. F A Jnergens.
Harness. J Paszkowski.
Harness. W H Sanborn.
Harvester attachment, self binding. W A Wilson.
Harvester, corn. A E Ellinwood.
Harvester, corn. J H Newell.
Harvester, corn. C Scheetz.
Harvester, grain binding. L Miller.
Harvester, potato C Christianson.
Hay elevator W Londen.
Hay tedder. W N Whiteley.
Heating boiler. S Bartley.
Heating device. A Bourkart Stalder.
Heel stiffener machine. N J Simonds.
Hinge, combination lock. E Lundgren.
Hinge, lock. J Ashton.
Hitching strap. F Sweetland.
Horses hot water bandages for treating. R Bustin.
Hose in towers, means for suspending. L W Hayes.
Household or kitchen ornament. O A Hensel.
Ice, apparatus for subdividing blocks of. L Pusey.
Ice making apparatus. W L Church and S A Reeve.
Ice rink. F Unsold.
Illusion apparatus. P Rosenzwey.
Incubator. C A Cyphers.
Inhaler. M A Boesger and F V Dotterweich.
Injector. W E Dodge.
Insulating covering for refrigerative purposes. G T Voorhes.
Insulator, electric conductor. J H Croskey and J Locke.
Jar closer. C E Long.
Joints, tube for use in expansion. B Hall.
Journal bearing. J L Jonsson.
Keyhole guard. G W Schumrcher.
Kilns, rack for decorating. C S Maedock.
Knife sections or other articles, apparatus for hardening. W F Johnston and J Gray.
Ladder attachment. T Wilkins.
Lamp. F Doelle and H Von Glahn.
Lamp, miner's safety. C Wolf.
Lamp suspending device. F Rhind.
Lathe carrier. B C Esmarch.
Laubhs polishing device for spoke. W H Joslin.
Lineman's use, tool for. S Smith and M B Mishler.
Loading apparatus. H Aiken.
Lock. A M Coan.
Locks, mechanism for detecting opening of. C Smyth.
Loom picker check. H R Mathews
Loom shuttle, self threading. J B Daudelin.
Luggage carrier. G F Hall.
Lunch heater. A L Wbite.
Matches, toothpicks, etc., machine for making splints for. E B Benham and H E Barlow.
Matrix making machine. M Lane.
Measure and square, combined tape. A E Krebs.
Measuring machine, cordage. S D Boatwright.
Metal bars, machine for bending flanged. W Pferrerkorn.
Metal bars, machine for bending flanged. A J Moxham.
Metal bars, machine for bending flanged. W Raymond.
Metal, means for joining edges of sheet, strip and plate. F A Williams.
Metal plates, feeding device for apparatus for coating. S Y Buckman.
Metals in imitation of faience, finishing. J Hopson, Jr.
Milling cutters, manufacture of. C C Tyler.
Milling cutters, method of and apparatus for making. C C Tyler.
Mines, preventing drafts in coal. E A Tiffany.
Molder's apparatus. A K Beckwith.
Mordant. R H Pickles.
Mosquito net frame. C P Dieco.
Mowers, grass catcher for lawn. J A Bubier.
Musical instrument attachment. L Utt.
Nail set. C G White.
Nut lock. N D Stanley.
Nut or bolt lock. F B Bradley.
Nut, vehicle axle. F E Boss.
Oil can. F B Smith.
Oxygen generator and holder. G R Prowse.
Oyster tongs. E E Leary.
Packing, piston rod. A B Kay.
Packing, piston rod. T Keene.
Padlock. F Raymond.
Pantaloons protector. T d'Arconit.
Paper box. H Goettsch.
Paper box. J Peterson.
Paper feeding machine. H B Cooley, J M Noble, and J E Trevor.
Parcel carrier. L Weiss.
Pasting machine. G A T Spooner.
Pavement of plastic composition. J H Amies.
Pencil sharpener. B Ramsay.
Petroleum, gas or oil engine. L Crebessac.
Pianos, repeating mechanism for. P Lindner.
Planter, check row corn. J F De Jaruatt.
Planter, corn. G W Campbell.
Planter, corn or cotton. M Brown.
Plate holder. M Flammang.
Plow point. T Prentice.
Plow points, mechanism for shaping the welding edges of, H G Sawyer.
Potato digger. T Donoho.
Potato separating and cleaning machine. I C Butler and C S Shepard.
Pressure regulator, fluid. S Olson.
Primary battery. C W De Mott.
Primary battery. C J Hubbell.
Printer's make ready. C Sears.
Printer's quoin. J F Perry.
Printing device, hand. C M Fowler and W Whitney
Printing machine, bed and cylinder. W Scott.
Printing machine feeder. G R Clarke.
Printing machines, stretching apparatus for calico block. W Westwell.
Printing plate and base. A G Wade.
Pruning shears. A Ellinger and W H Metzger.
Pulley. M B Lorah.
Pulley clutch and shaft coupling, automatic. L W Elliott.
Pump, air. A Heller.
Pump attachment A Menser
Pump, gas compressing. T Farnsworth.
Pump, oil well. A Rosenkranz.
Pump valve. T C Munger.
Purifier and aerator. J and T F Newby.
Radiator, steam or hot water. J D Young.
Railway block signal. C H Sherwood
Railway conduit, electric. M I Martin.
Railway crossing. A J Moxham.
Railway head and drawing frame. W E Sharples and F J Snell.
Railway rail. A Schwarzschild.
Railway, ship. A M G Scbillot and F Weidknecht.
Railway signals, mechanical trip for. C A Hammond.
Railway signaling, electric. W Daves.
Railway supply system, electric. J J Green,
Railway switch. C H Emke.
Railway system, electric. D Mason
Railway track. A C Mather.
Railways, self lubricating contact bar for electric. F W N E Hayn.
Rain gage, self recording. A J Grover.
Receptacle and adjustable seat, combined. J Boyd.
Rein supporter. R Stanhope.
Ribbon reverse, automatic. F P Stiles.
Riveting machine P A Chenot.
Rock or ore crusher. R D and P W Gates.
Roll-holders, tension spool for. T M Clark.
Rolls, driving live. M Garland.
Rolling mill, plate. W H Maddock.
Rolling sheet metal, method of and apparatus for. S A Davis
Roofs, grappling device for. D J Donovan.
Rotary bolt. T Stevens.
Rotary motor. A Delattre and F Bruckert.
Rubber mixing mill E F Bragg.
Sash fastener. J G Fox.
Sash holder and fastener. C W Ammerman.
Saw blades, machine for cutting tooth recesses in. F J G Fromholt.
Scaffold, painters. S A Brooks.
Scale, spring. C Spenser.
Screening apparatus 2 V Distl and A Susky.
Screw cutting die, separable. R Dost.
Screw making machine. R Hakewessell.
Screw making machine. E C Henn.
Seam, fabric. W F Beardslee.
Self fastening box. O Hemrich.
Sewing machine. J E Bertrand.
Sewing machine. P L Cox.
Sewing machine guide. C H Foster.
Sewing machine shuttle. P Diehl.
Sewing machines, automatic stop action for. J Faust.
Shaft attachment for buggies. H G Vaughn.
Shafts, device for securing cutters or other articles to rotary. W D Orcutt
Sheet metal plates, machine for cutting. S Y Buckman.
Shelf, folding. H A Payne.
Shutter fastening. E Weggmann, Jr.
Signal apparatus. C E Ongley.
Signal recorder, whistle. C E Ongley.
Signaling apparatus. B J Noyes.
Signs, manufacturing. R Schlegel.
Soldering iron furnace and gas heater. J B Laurent.
Sole leveling machine E C Judd.
Span or arch. E Keating.
Spark arrester. W Caspar.
Spooling machine bobbin holder. N H Easton
Sprinkler. R B Van Dyke.
Stamp or envelope moistener. A Stuebner.
Steam boiler. P Ferguson and W Y Fleming.
Steam engine, direct acting. W E Hill.
Steam motor, impact rotary. W H Willey.
Steering gear. J E Allen.
Stone crusher. C L Carman and P W Gates
Stone, ore, etc., machine for crushing O Williams.
Stone sawing machines, guide clamp for H W Rightmyer.
Stove door knob. W W Shoe.
Stove, gas. W A Todd.
Stovepipe fastener. J A Hadley.
Straw stacker. J M Welbourn.
Sugar wagon box. G W Miller.
Surgical chair F E Case.
Suspender ends, cast off for. G E Adams.
Switch attachment. C Olson.
Syringe. P B Laskey.
Telegraph key. L D Bliss.
Telephone exchange system. R Callender.
Telephone switch. R Callendea.
Telephone switch. A Stromberg and A Carlson.
Telephone transmitter. J and H M Goodman.
Telephone transmitter. M A Morehouse.
Telephone transmitter. J T Williams.
Thill coupling. J W Mullins and R M Jackson.
Threshing machines, self feeder for. A W Severance, G Jamison, and G W Braucht.
Threshing machines, shoe attachment for. G F Conner.
Thread cutting ring. H F Ganon.
Tie joint. W Livingstone
Tie plate and rail brace, combined. T R Gabel.
Tie plate, extension. W R Funk.
Tile, roofing. H Niederlaender.
Time recorder, employe's. G W Heene.
Time recorder, watchman's. A Newman.
Tire casings, mold for forming. J C Moomy and C Whitehead.
Tongs. F Raymond,
Tongue switch. H O'Shea.
Tool, combination. S J Johnston.
Torpedo boat, submarine. G C Baker.
Toy. W A Hill.
Toy. J A Murphy.
Toy. T S Thorn.
Toy. J Walker.
Trace carrier. C C Schwaner.
Train time indicator. W M Six.
Tramway, electric. H Schwieger.
Tripod leg. R G McDowell.
Trolley catcher. W F Kendt.
Truck, radiator. T B Mason.
Trunk fastener. R Flocke.
Turpentine, extracting J C Schuler.
Type casting and setting machine. G A Goodson
Type writing machine ribbon case. R G Hopkins.
Valve. L H Castle.
Valve facing tool. T Draper
Valve for steam engines, main slide valve and throttle. J P Devoissand.
Valve, globe. H R Frisbie.
Valve, oil well shut off. E Evans.
Vault, grave. J D Barens.
Velocipede. P Egeritt.
Vending apparatus. J A Williams.
Vending machine. T S Wheatcroft.
Voting machine. J Mourot.
Wagon bed lifting apparatus. O H Drinkwater.
Wagon, dumping. J C Proctor.
Waistband for trousers and device for attaching shirt waists thereto. J Schwarz.
Washboard M B Miller.
Washing machine. J L Knoll.
Watch case turning machine. C E Henriod Bachni.
Watches, center arbor for. W B Learned and J A Mosher.
Water closet and tank. P Harvey.
Water power. W E Vernon.
Wheel rim. A C Fairbanks.
Wick for oil stoves or lamps. O Ewert and H L Marbach.
Window screen. E C and W G Irwin.
Window screen. J G Schill.
Wire tightener. M I Hochstetlor.
Work support, adjustable. L P Davis.
Yoke attachment, neck. C C Schwaner.

PATENTS GRANTED DEC. 11, '94.

Advertising board. G C Evans and J W Layne.
Advertising purpose, cabinet for. G H Strong.
Advertising purposes, mechanical artificial flower for. J E Wenger.
Air brake mechanism. E G Shortt.
Air compressor. H C Sergeant.
Animal trap. R Scheibel.
Arc light hanger board. D J Cartwright.
Bale tie. W H Singleton.
Barrel washer. H J Ferguson.
Barrel washer. C L Kline.
Bath tub. R M Wilson.
Bath tub and traveling bag, convertible or combined. F von Oheimb.
Battery switch. H K Spangenberg.
Batteries, manufacturing plates for secondary. H F Kirkpatrick-Picard and H Thame.
Bearing, antifriction roller. J D Mattison.
Bed, folding. R T Barton.
Bed, folding. K L Hyller.
Bed, folding. M Samuels.
Bedsteads, head rest for. G G J Miller.
Beer bottling apparatus. V Oppl.
Beer drawing and saving apparatus. W R Dales.
Beer tapping device. H Friedlander.
Belaying pin, releasing. A V T Sabroe.
Bell and burglar alarm, door 2. J T Stone.
Belt, safety. H Scharf.
Bicycle. H W Libbey.
Bicycle attachment. E Scott and J O Burke.
Bicycle pedal. A Perkins.
Bicycles or similar machines, motive powder for. J Tullins.
Block signal apparatus. U J Fry and G M Basford.
Block signal apparatus, electrical. U J Fry and G M Basford.
Boiler and flue scraper, steam. J C A Marckmann.
Boiler furnace, locomotive. G H Watson.
Boiler tube ferrule. H S Ross.
Boilers, bracket carrier for. H Vogt.
Bolt and nut lock. J M Gaston.
Bone black, apparatus for decarbonising and revivifying. M Weinrich.
Boot or shoe soles, cutter for trimming. J J Mabray.
Bottle washer. A F and B C Dunnke.
Box blanks, machine for cornering. A E Kingsburg.
Brake shoe. H A Lewis.
Bushing and tap, bung. J Mohn.
Cable, running and carrying. J P Roe.
Cables, apparatus for transporting loads by traveling. J P Roe.
Calipers. G Oberbeck.
Car brake, railway. J A Webber.
Car coupling, B B Haydon.
Car coupling. E Latham.
Car coupling. J McDonogh.
Car coupling. A C Packer.
Car coupling. S T Smitq.
Car coupling. S N Washburn.
Car vestibule diaphragm. H C Buhoup.
Car wheels, chill for cast iron. P Connelly.
Cars, side bearing for. J H Campbell.
Carving machine. C S Yarnell.
Cash carrier apparatus, pneumatic. P J H Hazard.
Casket handle. L E Woodard.
Casting metal pipes etc., machine for making molds and cores to be used in. J Shepherd.
Casting molds, apparatus for drying. W Hansen.
Cellulose acetate. manufacture of. C F Cross and E J Bevan.
Cement, etc., manufacture of asbestos. A Kuhlewein.
Chair. E W Briggs, Jr.
Chimney stacks, atmospheric pressure relief for. B F Taylor.
Churn. J M Jaekson.
Churn cover. S D Palmer.
Cigar bunching machine. H Schmidt and C J Werner.
Cigar lighter, electric. C J Coleman.
Cigar mold. J H Ogden.
Cigarette machine. E T Pollard.
Clavo mandolin. C A Noack
Clipper for animals, mechanical. P Ashberry and W Barnes.
Clock or dial, calculating. F A Gottsch.
Clutch mechanism L E Mansfield.
Cockeye, spring W Finter.
Coffee cleaning and separating machine. J S Miller.
Coffee pot. T Glynn.
Coin holder. J W Grant.
Concentrates and apparatus for carrying out said method, method for recovering. J S Dougherty.
Condensing apparatus. J Rourke,
Corks, machinery for finishing, polishing, or surfacing. J E Howard.
Cotton chopper A E Schevey.
Cracker machines, etc, device for removing waste from sheets of dough in. J C Beisang.
Cradle. W J Shorfi I.
Crematory for burning garbage, etc. J E McKay.
Cultivator. J V Brady.
Cultivator. W H Holsclaw.
Cultivator attachment. D E Baker.
Cultivator, lister. B F Erway.
Current transformer, alternating. A W Meston.
Curtain stop. T Moyle.
Cycles or other road vehicles, brake apparatus for. J G A Kitchen.
Danger signal. G M Chace.
Dental articulator. D M Hitch
Dental saliva ejector. F D Sherwin.
Direction and speed device, variable. S L Heywood.
Ditching and tile laying machines, cutter screw for. O B H Hanneborg.
Door hanger stop. F A Austin,
Door spring. A D Phelps.
Doubletree. F M Beaver.
Dough shaping and cutting machine. F Buhrkop.
Drawing instrument. H Cole.
Dredging machine. J A Ball.
Duplicating apparatus. I S Haynes.
Dust collector. L S Hogeboom.
Dyeing slivers, etc, direct from combs, machine for. J A J Florin-Leclercb.
Electric machines, brush for dynamo. E T Platt.
Electric motor. F E Herdmon.
Electric motor propelled elevator. F E Herdman.
Electrical energy, system of transmitting and distributing, C C Chesuey.
Electromagnetic apparatus, suppression of self inductive obstruction in. S D Field.
Elevator. E W Honser and C C Decker.
Elevator controller, electric. L S Buffington and W C Jones.
Elevators, apparatus for controlling electric. N O Liudstrom and O P Cummings.
Ellipsograph. J A Caldwell.
Embroidery, J Kobelt.
Excelsior cutting machine. C G Smith.
Exercising machine. J Strong.
Extracting apparatus. C F Hood.
Faucet. A C Shaw.
Feed water heater, purifier, and separator. D Cochrane.
Fence. S C Bower.
Fence post, pressed steel. C T Schoen.
Fibers ann recovering sulfurous gases employed therein, apparatus for disintegrating. H Blackman.
Filter, oil. J T Fewkes.
Filtration. S R Lowcock.
Fire alarm. E P McCaslin.
Fire alarm and annunciator system. F S Palmer.
Fire alarm, automatic. W A Guthrie.
Fire alarm hut. H Trudel.
Fire basket or grate. J Zipp.
Fire escape. G L Silliman.
Fire escape. W D Thackston.
Fire extingnisher. M Wielandt.
Fire extingnishing apparatus. L L Gaiser.
Fire hose to ladder, apparatus for fastening. E F Richardson.
Fire kindler. F R Pearson.
Fire place and grate. E Scanlan, F W Keifel, Jr., and J Zipp.
Fish ladder. J A Richardson.
Flame focusing apparatus. C H Land
Flash plates to ventilating pipes and different pitched roofs, device for adjusting. B B Bignall.
Floor construction, P M Bruner.
Flue cleaner. P Fitzgibbons.
Flue cleaner. J O Frazier.
Folding chair. J Walton.
Foot rest, self adjusting. G J Shults.
Fork. M H Fuller.
Fruit drier, steam. V M Coulter.
Fuel, block or briquet of. T W Lee.
Funnel. H G James.
Furnace. J P Weis.
Furnace doors and mouths, combination water jacket for. S G Leysen.
Galvanic ring. D Hattenback.
Garment fastener. W S Wheatfield.
Gas engine. H T Dawson.
Gas engine. G Hirsch.
Gas lighting, burner for incandescent. M Horwitz.
Gate. F H Sturm.
Glassware, machine for finishing. W H Barr.
Glassware, method ot and apparatus for pressing. J H Croskep and J Locke.
Glove or other fastenings, device for attaching members of. W S Richardson, J B and P B Chase.
Gold separator and extractor. J B Betteger and J Schwartz.
Governor. A D Moore.
Governor, steam engine. L A Le Mieuz.
Grain binder. J S Davis.
Grain drill. R Galloway.
Grain, pneumatic apparatus for conveying. F E Duckham.
Grease trap. M J Gibbons.
Guns, trigger mechanism for. F D Granger. (Reissue.)
Hair curler. T C Moore.
Hame. J A Meany and C H Schnitzier.
Harness, track. J L Whipple.
Hay loader. C O Jewett.
Heel. G Fowler.
Hinge, blind. N McKinnon.
Hinge, strap. L H Sholder.
Hitching strap. J H Valleau. (Reissue.
Hook and eye. J F Schoeppl.
Horseshoe 2. W J Kent.
Horseshoe. E Richardson.
Horseshoe elastic tread. W R Howe.
Horseshoe nail machine. R C Lambert.
Hose, etc., manufacturing samples of. W F Bowers.
Ice cream freezer. R P Jones.
Ice making apparatus. D L Holden and L W Serrell.
Ice manufacturing apparatus. D L Holden.
Ice pick. H A Vandouten.
Ice shaving machine. C E Reid.
Inclined surface, device for supporting workmen or objects on. D Forton.
Incubator. M G Benton and G J Nissly.
Incubator. J E Stanley.
Incubator. A Wickey.
Injector. F Brunbauer, (Reissue.)
Ink well. W B Pratt.
Inlaying metal goods with tortoise shell or celluloid. H F L Anmont.
Insulating compositions for electrical purposes, manufacturing. A N Ford.
Insulator. L McCarthy.
Insulator for electric overhead construction. H P Ball.
Japanning furnace. P J Pauly, Jr.
Knife. J H Cook, Jr
Knife sharpener. B H Berkman.
Knob attachment. F H Richards.
Lace making machines, thread controlling device for. C F Wolferts.
Ladder, ironing table, and washbench, combined step. H G Rounds.
Lamp, incandescent. J R Grove.
Lamp, incandescent electric. E Keye.
Lamps, shade holder for incandescent electric. M W Crandall and E A Russel.
Lantern. G Rowland.
Lathe for axle boxes, turning. R R Spears.
Lawn sprinkler. T Maher.
Life saving apparatus. K Hoekstra.
Liquid dispensing apparatus. W R Dales.
Loader and sled, fodder or feed. E F Eewis.
Lock. O F Teed.
Locomotives, controller for electric. J W Darley, Jr.
Locomotives, throttle actuating mechanism for. E G Shortt.
Loom let off. C N Martin.
Lubricating device. S V Kennedy.
Lubricator. L O Orton.
Mail bag. A F George.
Mangle. P O Johnson.
Manifolding device. E B Tilton.
Match splints, machine for coiling. C B Andrews.
Measure, rotary. J Gray.
Measuring apparatus, hat. A Allstadt.
Mechanical movement. S B Ourtis.
Melharmonium. L P Schpanowsky.
Metals, making plates, etc., of combined. A Rodig.
Mill guide, rod. W A Kilmer.
Mining drill 3. R H Elliott and J B Carrington.
Monkey and pipe wrench, combined. S M Friede.
Mortar mixing machine. W Rennyson.
Nipple connection. T R Brien.
Nut lock. H L Wood.
Nut lock, ratchet washer. E H G Brinser.
Oar, bow facing. F Harbers.
Oil purifier. D H McClelland.
Ore pulverizing and amalgamating mill. J W Bailey.
Packing box. L Weiss.
Packing, joint making. R Kruger.
Paper bag machine. W R Purvis.
Paper pulp, process of and apparatus for making. H Blackman.
Paraffin, etc., barreling. C C Burke.
Parcel delivery system, K J C Carville.
Parer and slicer, vegetable. J Senbert.
Pawl and ratchet mechanism. H R Towne
Pencil sharpener and point protector. J T Mundy.
Penholder. W T Rightmyer.
Pen, writing. G Schagen.
Permutation lock. F C Richards.
Pipe wrench, chain. J H Newell.
Pipes, drain cup and strainer for air. A P Massey.
Pipes, street box for gas or water 2. F A W Davis.
Pits or vaults, constructing water tight. W Macleod.
Planters, feed actuating device for. P E

Johnson.
Plug, tube. A L Harrison.
Pocket, garment. P L Mahyn.
Pocket knife. C C Moritz and S D Greenwood.
Pocket knife. J P Nordlow.
Press. M Swenson.
Pressure regulator and stop valve, automatic. I N Gaskill.
Pressure regulator, fluid. J Wilson.
Primary battery. G H Gardner.
Primary battery. W Walker, Jr., and F R Wilkins.
Printing device, chromatic. T J Turley.
Printing press. R Clark and L M Crom.
Printing press W C Wendte.
Printing sheets, perfecting press for. W C Wendte.
Pulp, manufacture of wood. E Nolon.
Pump. F E Herdman.
Pump motor. B Mellor of Mark.
Pumping. M E B DuMarais.
Punch, gang. F D Swaney.
Puzzle. F Hesse.

Rail bond or connector. C J Reed.
Rail chair and tie, combined. J Albrecht.
Rail cleaner and car fender. J S Tomer.
Railway, conduit electric. D Mason.
Railway, elevated. J N Valley.
Railway frog foot guard. M Riley.
Railway signal. J V Richardson.
Railway tie plate. B Wolhaupter.
RailwaT tie, timber. L C Ingersoll.
Railway torpedo E G Shortt.
Railway trolley, conduit. W E Delabarre, F M Frazer and R A Carrick.
Railway trolley, conduit. J C Hawley and W J Black.
Railways, carriage for elevated. J N Valley.
Range or cooking cabinet, gas. F C De Prengal.
Range tank. J J Malley.
Reamer. F Hatmaker.
Refrigerating apparatus. O Kuphal.
Refrigerator. L C Taylor.
Revolver. C Foehl.
Revolver J T Smith.
Revolver casings, machine for counterboring barrels of. E M Couch.
Revolver cylinders, machine for counterboring chambers of. E M Couch.
Rheostat. T W Shelton.
Rose and escutcheon, combined. C R Uhlmann.
Rotary engine. D F Allen.
Rotary steam engine. H Staub.
Rotating stand. A Baldwin.
Rule, draftsman's. F W Atpcter.

Sad iron. H M Cooley.
Sad iron. B Rein.
Saddle blanket. J L Torrey.
Sales register, manifolding. W Assheton.
Sash holder. G E Schairer.
Sash, window. C F Olcese.
Sawbuck. S D Palmer
Saw driving mechanism. C C Newton.
Saw metal. M Odgers.
Saw set. J T Bernard.
Saw teeth, device for side dressing. G Fritz.
Sawing apparatus, cold. H Ehrhardt.
Scaffold, adjustable bracket. R O Davis.
Screw cutting plate. H B Keiper.
Seed and hulls, process of and apparatus for treating cotton. W C Johnson.
Sewage and apparatus therefor, treatment of. W D Scott Moncrieff.
Sewers, manhole for. G Wright.
Seztant attachment. T T H Ferguson.
Shaft locking mechanism. E G Crawford.
Shafts to vehicles, device for attaching. W T Sears.
Sharpening gravers or other tools, holder for. J S Vernier.
Shingle planing machine. E H Kruger.
Shirt. J L Knight.
Shoe cleaner. W A McGreery and J Taylor.
Shutter, window. S F Greene and S W Law.
Sign, street. H H Baker.
Silks, etc., holding device for embroidery. L O Smith.
Siphon. H H Shufelt.
Shiphon, regenerative. F Lamplough.
Sizing walls, composition for. R J Sisk.
Skate. W H Nicholls.
Skate. C J Wezeu.
Snap hook. J C Covert.
Snow plow. A M Burnham.
Snow plow, rotary. W O Wood.
Speculum. J D Sherbrook.
Speed recorder. J Naylor, Jr.
Spout, single piece sheet metal. J W Greene.
Sprinkler. W A Koneman.
Sprinkling head. C A Weed.
Square, try. F Houle.
Stable device, safety. E J Gallaghar, Jr.
Stamp, hand. A J Dickson.
Station indicator. D B D Blake.
Staves, machine for jointing listed. A M Benson.
Steam boiler. A F L Reussner.
Steam engine. W D Sherman.
Steam generator. P Fitzgibbons.
Stone planers, shaping attachment for. H W Rightmyer.
Stove, oil. E G Mummery.
Stove, oil. A C West.
Stoves, heating attachment for gas cooking. J Guy.
Strainer. D B Gotham.
Straw board lining machine. L Blessing.
Street indicator. A Hadam and C Wolf.

Tanks. automatic shut off mechanism for water. R Schaeffer.
Telephone system. W Oesterreich.
Telephone transmitter. A F Boardman.
Thrashing machine. I W Woodburn.
Tire heater, wagon. I Harvey.
Tire, pneumatic. C B Sheldon.
Tire, steel spring. W H Measures.
Toy. S S Eccleston.
Toy. F B Harvey.
Toy, pneumatic. F G Stone.
Toy track or course. D C B Griffith.
Track apparatus, overhead. J F Bork and J Simaull.
Trolley tracks, switch for overhead. G G Schmidt.
Trolley wire and support therefor. H H Ashley.
Trolley wire clamp. M M Wood.
Trombone. E A Leland.
Truck, barrel. O J Bowser.
Tubing, attaching socket for. J J Vautier.
Turbine. S and G H Harrison.
Turbine wheel, steam. E Seger.
Twine holder. W S Braden.
Type writing machine key cap. D P Wolhaupter.

Umbrella. W R Tebow.
Underwaist. F Kern.

Valve. C Birkery.
Valve, balanced piston. J A Smith.
Valve, cylinder relief. B T Reilly.
Valve, steam cylinder L Boudreaux.
Vapor burner. E G Mummery.
Vehicle. J Bidge.
Vehicle. pneumatic. A C Rand.
Vehicle shifting seat. G E W Stivers.
Vehicle spring. G Penn.
Vending machine. E A Thissell.
Vessels, apparatus for removing sales from fireholds os 2. A McDougall.
Vise. J J Tower.
Voting machine. D Dobbins.

Wagon bed. C P Lancaster.
Wagon box lifter. J W Hayes, Jr.
Washboiler. J K Hawkins.
Washing machine. U Reiffer.
Washing machine. P J Russell and L De Vaux.
Waste or rag picker. E R Coverdill.
Watch. J L Hutchinson.
Water gage, magnetic. L Kleritj.
Water meter. G B Bassett.
Water tube boiler. D Smith and H P Goldrick.
Weather strip. D A and J H Bodiker.
Well packing. E P Warner.
Wheel rim. E Warwick.
Wheel testing apparatus, water. J Emerson.
Whist adparatus, duplicate. W Sowden.
Winding or spooling machine. W A Smith.
Wrapping machine. I R Hutchinson.
Wrist pin, adjustable. F L Stone.

PATENTS GRANTED DEC. 18, '94.

Addressing envelopes, etc., machinery for. G Clark.
Advertising machine, sign. O P Briggs and W R Patterson.
Agricultural machinery, gearing and gear covering for. J D Schofield.
Air brake. J D P Schenck.
Air brake governor. T H Haberkorn.
Air brakes, block system for automatically operating. J H Fox.
Air brakes, dog for actuating. J H Fox.
Air brakes, mechanism for automatically actuating. J H Fox.
Air brakes, track device to automatically operate. J P Clifton.
Alkali, process of and apparatus for the production of caustic. C T J Vautin.
Apartment house. M L Ungrich.
Apples, pears, etc., machine for pulping. C J Ollaguier.
Ax polls, machine for making. E Rogers.

Bait receptacle. W B Gilmore.
Baling press. A L Cox.
Baling press. C E Whitman.
Bandage, suspensory. J Teuscher Jr.
Barrel making machine. W T Vale and G A Ohl.
Bearing wheel, ball. H F Coates.
Belt, electric. L F Fuller and A J Taylor.
Bench stop. J Daily.
Bicycle brake. I W Litchfield and T W Sanford.
Bicycle lubricator. C O Furbush, Jr.
Bicycle safeguard and support. T L Bissell.
Binder for music, magazines, etc. W C Boeing and T P Stork.
Bleaching powder, apparatus for making. C Kellner.
Block signaling system, electric. A J Wilson.
Bottle stopper and filler, combined. I Pomeroy.
Bottle stoppers, machine for feeding crown. N Muslar.
Bowling ball. F G Dokkenwadel.
Box. Z B Webb.
Bridge, truss. D F Lane.
Bridle bit. F Swales.
Brooder, chicken. L C Billings.
Broom. D A McDonel.
Brooms, manufacturing. D A McDonel.
Brush handle, flue. E P Hunt.
Buckle, suspender. J N McGriff.
Burglar alarm, detonating. J W Horn.
Burglar alarm system. A Stromgerg.
Burglar alarm systems, circuit closer for. A Stromberg.
Burning granular fuel, apparatus for. C W Claybourne.
Button setting machine. A J Shipley.

Cabinet, stationery. L C Beardsley.
Cables, tension device for towing. W F Humphrey and S V Hoffman.
Candle grasp. H Glaser.
Candy. machine for cutting stick. J M Allaadyce.
Car brake. E Allen.
Car brake and power controller, electric. A W Mitchell.
Car brake, autometic. H E Olson.
Car construction, railway. C A Smith.
Car coupling. L T Backus.
Car coupling. J Clark.
Car door. R T Garland.
Car fender. G W Engel and W C Juram.
Car fender, automatic street. J T Van Gestel.
Car fender, street. W H Brock.
Car motor, street. J Radomiski.
Car seat, reversible. S Hoffman.
Card, reinforced Stencil 2. F D Belknap.
Cartridge shell for practice shooting. W M Thomas.
Cash registers, multiple adding machine for. C J Ryberg.
Cash registers, sealing device for. J O Byrns.
Chain link. R A and C Breul.
Charging apparatus. E Solvay.
Chart, astronomical. F E Ormsby.
Churn. J A Maddox.
Clay product machines, cuttor for. J H Omwake.
Clipper attachment, hair. C O Bechstedt.
Clock, electric program. J L McCaskey.
Clothes line fastener. C Bartsch.
Clutch, friction. J A Barnes.
Coffee pot. C C Davis.
Coin holding and delivering device. C F Kraump.
Compound engine. J Peebles.
Confectionery machine. S J Hicks.
Controller handle. H Mittseldorf.
Corset. T S Gilbert.
Cotton gin, roller. O F Goodwin.
Cotton opener. A Kirschner.
Cotton presses, combined belt shifter and brake for. T M Wallace.
Couch bed and bath tub, combined. B S Maben.
Coupling. S A Stahley.
Cribs or bedsteads, support for canopy rods in metallic. W T Mersereau.
Cultivator. T Belair.
Cultivator. A Lindgren.
Cultivator, disk. H E Dodson.
Cultivattor standards, device for adjustably attaching weed cutters to. W A McCoy.
Cyclometer. J A Mosher, W N Beardsley, and A D Moulton
Cyclometer. C E Moss.

Danger signal and lock for switches. G E Edwards.
Dental bracket. A Bond.
Dental napkin holder 2. G A Bronson.
Dental plates, forming. M P Boyd.
Derrick. M Beal.
Display rack, combined folding and revolving. W H Conrad.
Ditching machine. A C Carter.
Door check. C W Hamshaw.
Door, flexible. A S Spaudling.
Door operating device. W C Lucas.
Doors, device for operating sliding. W H Brodie.
Dovetailing machine for preparing edges of parts of electrotype or stereotype plate blocks. E C Williams.
Draftsman's instrument. O F Hill.
Drilling machine. F W Williams.
Dust pan. G H Gete.
Dye, blue. J Bierer and C De la Harpe.
Dye, substantive red. J J Brack.
Dynamometer. R J Rolfson.

Eaves trough. A C Kanneberg.
Electric conduit. T T La Pointe, J H Flanagan, and C A Thompson.
Electric converter. F C Priestly.
Electric meter. T Bruger.
Elevater controlling device. C E Foster.
Elevator controlling device. A B See and W L Tyler.
Elevator guard. N Levinson.
Elevaters, safety grip device for. H R Smith.
Engine 2. E J Woolf.
Engine for operating clutches or other devices J K Howe and J Clark.
Envelope. H C F E Snowman.
Envelope opener 2. A O Blomgren.
Excavating, ditching, or dredging machine. G L Lewis
Expansion bit R H Brown.
Extension table. A Oberlander.
Extracting apparatus. W T Forbes.
Eyeglass folding frame. A Brunner.

Fare register. E Catlin and G Rein.
Fare register. E T Taylor.
Fence stay. W D Albright.
Fence stay, wire. D B Yonnce.
Fender. J M Cable
Fibrous material, molding vegetable. B McCabe and A Thayer.
File, account. J U Parrey.
File cutting machine. J Beche, Jr.
Filter. A J and D Hyman.
Fireatm, breech loading. D S Seymour.
Firearms, shiftable firing pin and extractor for. D S Seymour.
Firearms, Shiftable nose on hammer and automatic extractor for. D S Seymour.
Fire escape. W D Rumsey.
Fire extinguisher, automatic. E W Storer.
Fire extinguishers, sprinkler head for automatic G E Hibbard.
Fire extinguishers, valve for automatic. G E Hibbard.
Fish hooks, minnow holder for. F Stapp.
Fishing line sinker. C W Black and B J Chapman.
Floor. D McDonald.
Floor, fireproof. O W Norcross.
Flushing attachment. J A O'Connor and G H Graham.
Folding camera. G D Milburn.
Folding joint for bars or rods. A Hofbeck.
Furniture. R B Sigafoos.

Gage and square, combined hinge.
Gas, apparatus for the manufacture of. W A Allen.
Gas cut off, automatic. L Johnson and L Fridlund
Gas generator. J L Hastings.
Gate. J W Shanbeck.
Gear case. W Biddles.
Gear wheel connection, safety. H K King.
Gearing, multiple. F C Robinson.
Globe, geographical. I and M A Hodgson.
Governor for engines. A H Fisher.
Governor, steam engine. H G Smith.
Grinding mill. H B Hebet.
Grooves, method of and implement for forming. J G Wilson.
Gun, machine. F Ebeling.
Gun, Magazine. W H Ostrander.

Herness. W A Fleming.
Harrow. J L Scudder.
Harvester knotter W B Brown.
Hasp lock. F F Getze.
Hat lining machine. H Charmbury.
Hat pin. O Congleton and G R Boyd.
Hay rake and loader. J Martin.
Heating, smelting, and separating, apparatus for electric. J W Woodfolk and J C Wharton.
Hitching device. A G Hamblin.
Hook and eye. J H Doyle.
Horse detacher. J E Berkstresser.
Horseshoe nails, machine for making. J A Coleman.
Hose bridge and tower. J Blake and E F Begiebing.
House. D H Hibbert.
Hydrocarbon burner. C E Cookerly.
Hypo-eliminator. A Schmidt.

Index or display device. J A Fischer.

Jar cover, fruit. V Biartt.
Jeweler's press. C M and G W Adams.

Kiln. W S Williams.
Knitting machine. J F Pharo.
Knitting needles, making. A B Dodge.

Lamp burner. F Rhind.
Lamp for electric railway cars, signal. C H Baker.
Lamp reservoirs, oil indicator for. F G Echols.
Lamp socket, incandescent electric. C H Balsley.
Lamps, spark arrester for arc. E M Clark.
Lantern, Velocipede. R P Gormully.
Lathe for turning elliptical forms. C W MacCord.
Lavatory apparatus. D Ketas.
Level, plumb, and slope indicator, combined O A White.
Linotype machine. P T Dodge.
Linotype machines, composing mechanism for. O Mergenthaler.
Liquid purifying apparatus. J T Harris.
Liqnids, method and apparatus for purifying. J T Harris.
Lock. E E Forsell.
Lock. F W Schultze.
Locomotive feed device. L Lazerus.
Locomotives, hand operating mecnanism for electric. A W Mitchell.
Loom shuttle tension device. I A Hall.
Lubricator. W P Miller.
Lubricator. F E Small.

Magazine, dust proof single delivery cover glass. A H Cole.
Malted food. M Watson.
Manure spreader. D B Merrell.
Match box, suspendable. J M Heimann.
Match receptacle. F D Halsey.
Measuring and registering device. G Krueger
Metal wheels, making wrought. A A Stevenson.
Metals from sulfide ores, etc., extracting. V Engelhardt.
Milk, testing. I K Lind-trom.
Mining machine, coal. P F Campbell.
Motion, means for transmitting. H C F E Snowman.
Music boxes, damper attachment for Swiss. W H Hoschke.
Musical instrument, automatic. W H Hoschke.

Nut, axle. E N Anderson.
Nut lock. H Dolan.
Nut lock. D Rhodes.

Ordnance. recoil actuated hydraulic breech operating mechanism for. J B G A Canet.
Ore crusher. A H Schierh lz.
Ore grinder and separator. J W MacDonald
Ores, process of and apparatus for desulfurizing. L Pelatan and F Clerici.
Organ coupler. C Wales.

Packaging machine. J S Voitek.
Paper web feeding device. J L Cox.
Partition for buildings. J F Golding.
Pavement, artificial stone. F L Fry and W J Fisher.
Pen, ruling. L Johnson.
Pencil and sharpener, combined lead. T F Harris.
Pencil case 2. R H Ryan.
Photochromoscope and photochromoscope camera F E Ives.
Photographic plate holder. J E Thornton and E Pickard
Piano case. A J Newby.
Pipe coupling. O Ames.
Pipe wrench. H Lind.
Pipe wrench. G P Woelfel. (Reissue).
Pipes, machine for making conductor. E H Fickinger.
Planter and fertilizer distributer, corn. J W and W C Duryea.
Planter check row attachment. S W Harman F H Romans.
Plow. G Drovedal.
Plow beams, weight for. J A L Gist.
Plow, rotary. N H Roberts.
Pneumatic spring. A C Mather.
Pneumatic tool. D Drawbaugh.
Pocket book and head rest, combined. F Deaio.
Polished rod adjuster. F M Kennedy.
Powders, etc., device for dividing. R Walsch.
Preserving apparatus, fruit. S S Savage.
Printing machine. T Bartholomew.
Printing machine, wall paper 2. W H Waldron.
Pulley, split. W R Patten.
Pump. E E Frizell.
Pump. W R George.
Pump, centrifugal. M Wagner.
Pump, double acting. F J Brown, A and S Allen.

Rail chair and tie. E N Higley.
Railway chair. C Chenu.
Railway crossing gate. J Rutherford.
Railway frog and switch. F Hardy.
Railway gate. C A Ball.
Railwny rail. L K Devlin.
Railway switching device. H L Walton and W A Griffiths.
Railways, electric safety appliance for. E L Orcutt.
Rein support. C E Ford.
Respirator. H Simons.
Rock drill. H P and G B Jones.
Rolling mill. S Johnston
Rolling mills, means for adjusting rolls for. O Klatte.
Rosin pad for use on bows of stringed instruments. H H Heskett.
Rotary engine. W G Adams.
Rotary motor. O Arnold.
Roving frame. M Campbell.

Sales recorder, manual. A C Hough.
Sandpaper cylinders, device for adjusting. J L Perry.
Sash mounting, swinging. L G Abbott and T D Greene.
Saw swage. C A Schoessel.
Sawing machine, log. A L Grinnell.
Sawing machine, portable. J H Langton.
Scale, computing. W R Stover.
Scale, weighing. J R Witzel.
Scale, weighing and price. R A Daniels.
School seat and desk. L E Kretzmeier.
Scraper, earth. J Maes.
Screw blanks, machine for threading wood. T B Smith.
Seal. S A F[illegible].
Se[illegible] F R [illegible].
Sewing machine. J [illegible] and A [illegible].
S[illegible] F [illegible].
Sewing on buttons machine for. E H[illegible].
Shade, window. S L[illegible].
Shirt. J Stecker.
Sheet [illegible] T Owen.
Shutter, self closing W W P[illegible].
Silk, manufacturing artificial. H[illegible] Chardonnet.
Slack adjuster. H H[illegible].
Sled propeller. W L Prindle.
Sleigh H P Jensen.
Sounder F F Howe.
Speed of vehicles, apparatus for recording. F Bayerdoerfer.
Spirometer F W Baker.
Stake or post base. J H Langton.
Stave jointing and crozing machine. T Bruno.
Stave jointing machine. L T Hagan.
Steam engine. A Miller.
Steam engine. H Nielsen.
Steam engine. W S Rush.
Steam trap. T S Smith and A M St[illegible].
Steel plates, producing locally annealed. H Lemp.
Steel, reworking scrap. H Harris.
Stock trough. T C and and H W Harry.
Stone cutting tools, securing diamonds in. R Marquart.
Straw conveyer. W L Johnson and W L Hay.
Street sweeper. W H Walker and T H Boyce.
Switch operating device. C Diener.
Switch setting and locking device, electrical. K Moderegger.
Switch working mechanism. J and C MaGhee.
Switches, safety shift or lock split. G L Warren.

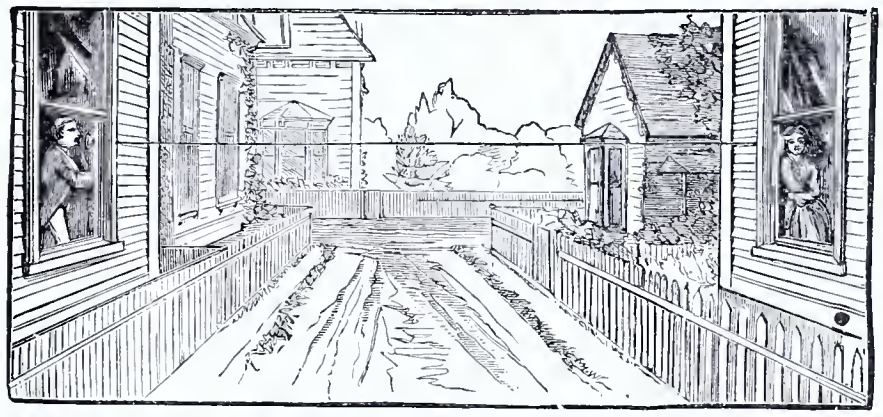
Table. J Waddell.
Tablet, writing. M Rubin.
Target traps, release for. B O Bush.
Telegraph key, finger board E E Mullinix.
Telephone speaking tube system. T C Wales. Jr.
Telephone transmitter. D A Kusel.
Tender scoop W F Kiesel, Jr.
Terra cotta and other fireproof constructions. J W Rowell.
Thermometer. J T Craw.
Thrashing machine dust conveyer. M L Shuster.
Thrashing machine, field. A Anderson.
Thread tension, wheel for. S W Wardwell, Jr.
Tire tightener. T Rodwell.
Tobacco dressing and feeding machine. J E Bucklin.
Tongs. W Lott.
Tree protector. C Goersch.
Trolley track. W H Beodie.
Trolley wire finder. F F and W S Meyer.
Trolley wheel guide. W H Dickelhoof.
Trousers fastener. J N Rhoads
Truck, barrel. C A Hutchinson.
Truck, hand. D Y Grieb.
Truck, railway. W A McGuire and M G Hubbard, Jr.
Trunk. K S O'Keeffe.
Truss. J F Stafford.
Type, machine for cutting rubber. L K Scotford.
Type writing machines, attachment for rolls of paper to. G L Crittenden.

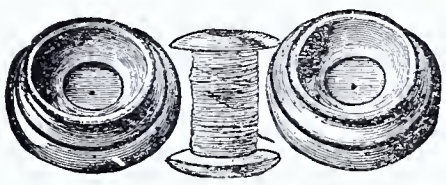
Unicycle. F H Armistead.

Valve for high pressure gases and fluids buffer. A Mueller.
Valve gear, steam engine. L O Burk.
Vapor engine, combustible. R B Hain.
Vehicle body. E I Tennant.
Velocipede, marine. W Dryden.
Veneer cutting machine. W H Powers.

Wagon brake. W Petering.
Wagon, dumping. M L Senderling.
Washing machine. J W BeeWar and D Shaw.
Water heater or cooler. W Morrison.
Well boring apparatus. L Gist.
Wheel. P Ambjorn.
Wheel cleaner. L B Fleming.
Wheel rim, vehicle. F L Goodrich.
Winding machine, thread. S W Wardell, Jr.
Windmill. S K Humphrey.
Windmill regulator. A S Clark.
Wire stretcher. A Nickle.
Wrench. A Sellers.

A PRACTICAL TELEPHONE.





Cheap Enough for a Toy, and Good Enough for Practical Use.

This simple little instrument is sure to meet a general want in supplying the place of Speaking Tubes and Electric Bells, at less than one-quarter of the cost. One of its principal recommendations lies in the readiness with which it may be put into PRACTICAL use in connecting separate rooms in the same or adjoining buildings, such as Manufactories, Shops, Stores &c. It has been thoroughly tested, and its satisfactory working, together with the low price at which it is offered, must insure its general use. Complete directions for setting up, also 200 feet of Composition Wire, accompany each Telephone. All packed complete in wood box. Extra wire for Telephone 35 cents per 100 feet; each 100 feet on spool. This telephone is warranted to work for a distance of 1,000 feet, if put up according to the directions accompanying each box.

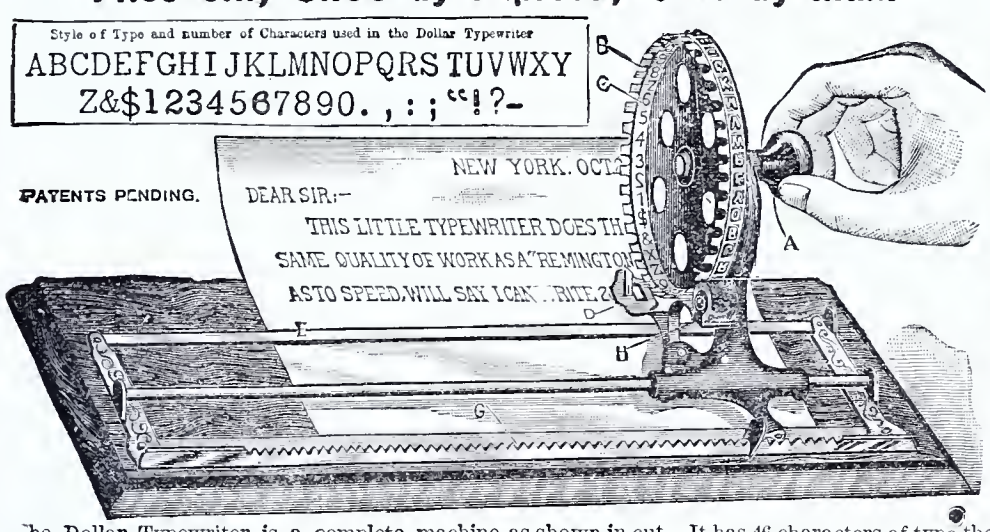
Postage 20c. **Price $1.00 Complete; $10.00 Doz.**

Add 50 cts. for "Inventive Age" one year.

THE DOLLAR TYPEWRITER.

A PERFECT TYPEWRITING MACHINE.

Price only $1.00 by Express; $1.15 by Mail.

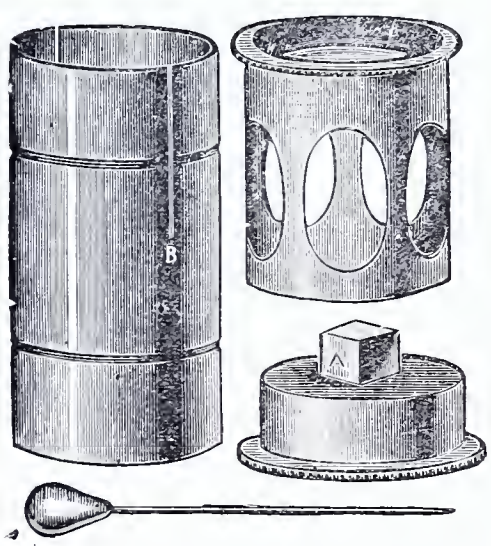


The Dollar Typewriter is a complete machine as shown in cut. It has 46 characters of type the same as that used on a Remington. It is provided with numerous patented devices for inking the type, holding the paper, spacing and governing the impression and alignment. It will write a postal card, note or full letter sheet and is particularly well adapted to addressing envelopes. It is a practical illustration of what a rare combination of ingenuity, skill and capital may do as it embodies many difficult and expensive mechanical movements which were heretofore only possible in high price machines. Over a **QUARTER MILLION** of these machines have been sold within the last year and the secret of its great success is that the manufacturers commenced with a foundation of original ideas and then spared no expense in putting them to practice by the use of the best machinery to be devised. If no more could be said of it this Typewriter is worth many times its cost as an instructor of children teaching and amusing at the same time, but its features of practicability commend it to the use of nearly everyone and the sale it has had and will have is not surprising. It **IS A PERFECTLY CONSTRUCTED** machine that will do work equal in quality to any of the high priced machines. It is so **SIMPLE** that a **CHILD CAN OPERATE IT** and will not get out of order. It is **LIGHT** and **PORTABLE**—just the thing for travelers. It is very **ATTRACTIVE** in appearance, made entirely of metal, mounted on a highly polished hard wood base. It will **WRITE RAPIDLY** with practice—15 to 25 words a minute. We **GUARANTEE** every claim for it, and if not as represented **REFUND MONEY.** The **PRICE** is but **ONE DOLLAR!** This is the age of typewriters, and no one should be without one.

Any typewriting that may be done with any of the high priced machines, from $100.00 down may be done with this one. It is now possible for **EVERYONE** to own a Typewriter and address and write their letters, postals, etc., in the same way the richest firms do theirs. The monopoly in Typewriters died when **"THE DOLLAR"** was born. Postage 15c. **Price $1.00 Each.**

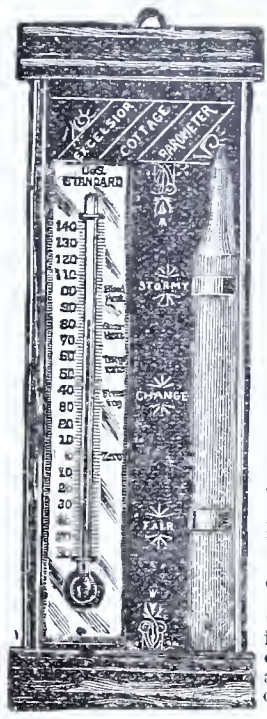
With "Inventive Age" one year, $1.75.

COMBINATION MICROSCOPE.



Scientific skill and the greatest perfection in workmanship coupled with a very high magnifying power, distinguish this handsome microscope over all others ever offered at popular prices. It is specially imported from France, and readily sells for one dollar at retail. As regards power and convenience of handling, good judges pronounce it the best ever introduced for popular use. The cylindrical case is manufactured from highly polished brass, while there are two separate lenses—one at each end of the microscope. The larger glass is a convex magnifier, adopted for examining insects of various kinds, the surface of the skin, the hair, fur or any small articles. It will magnify the hairs on the hands or arms till they resemble large ropes, and it is a most interesting companion. The other lens is exceedingly powerful, and will clearly delineate every small object, entirely invisible to the naked eye such as the animalcules in a drop of water, fishes, feathers and the minutest insects. An interesting illustration of its great power may be had by placing a drop of sour flour paste upon the bottom of the lens, when on looking through the eye-piece, the sight of the writhing mass of thousands of worms, snakes and eels, is one never to be forgotten. Thousands of living animalcules can be seen in a single drop of stagnant water. An insects eye is a very beautiful object when seen through this microscope. It reveals hundreds of small eyes or six sided facets resembling net work or honeycomb, which enables the insect to see in all directions without moving its head. There are 4,000 of these little eyes in the single eye of a fly. It is invaluable in detecting adulterations in food, such as flour, tea, coffee, sugar, spices, milk and the fatal trichina spiralis or pork worm. Postage 3c. **Price 47c. Each.**

With "Inventive Age" one year, $1.35.



THERMOMETER & BAROMETER

COMBINATION.

Combination Barometer and Thermometer.- Our well known leader. Blue and Gilt back with metal side posts. Fancy top and bottom and handsome enough to decorate the home of a millionaire. Extra well made and dependable on for showing changes in both weather and temperature. One of the biggest bargains in our list. A handsome thermometer, together with a glass tube containing a chemical preparation which rises and falls by action of the atmosphere, foretelling correctly all changes in the weather. This is a new style storm glass and the most reliable ever known, being in use in all signal service stations. The slightest change in the atmosphere in some way affects this glass. The thermometer is also of the best quality. Both are enclosed in a stand with walnut top and bottom and blue and gilt back. On either side is also a strong metal bar giving the whole great strength and adding to its appearance. Altogether it is a most remarkable combination for the price and we take pleasure in offering it to our patrons

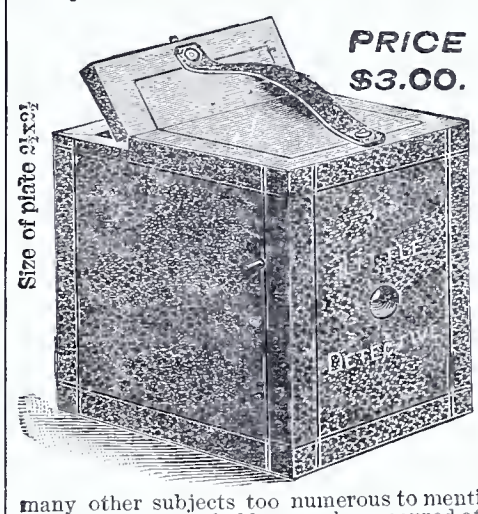
This is not one of the many cheap combinations of which the market is flooded which are neither good for ornament or use and can never be relied upon to forecast either the weather or in fact any thing else.

There is no reason for you to depend on the weather Bureau reports as every person who owns one of our Combinations, can make his or her forecast and tell exactly when it will be fine, rainy and in fact every change in the weather. With this you can tell whether to put on rubbers and a mackintosh or a pair of summer shoes and a costly dress. Don't take any more chances about the weather but be prepared. Each one packed securely in a neat box so that they can be mailed up without any fear of getting broken or damaged. Postage 10c. **Price 32c. Each; $3.00 Doz.**

With "Inventive Age" one year, $1.25

THE LITTLE DETECTIVE CAMERA.

Fully Guaranteed to take Perfect Pictures of every class "as quick as a wink."



PRICE $3.00.

Owing to the many intricacies in the construction of an instantaneous camera, particularly in the matter of lenses and shutters, it has required many years of persistent experimenting by men of large experience to produce at a low price a **perfect** and practical machine. As a result of this labor we now offer **"THE LITTLE DETECTIVE"** which we guarantee to do as good work as many others now on the market sold from ten to twenty-five dollars.

The plates being small make the expense for taking pictures very low, and still they are large enough to make an interesting collection of scenes and subjects that can be photographed during your daily outings in city or country. The negatives are also of a suitable size to make Lantern Slides or Bromide Enlargements from. The Camera is of such a size that it can be carried in a satchel or hand bag and takes up very little space, its dimensions being 5 inches long, 3¾ inches wide, 4¼ inches high, and is handsome in appearance being covered with genuine leather and has a handle on top for convenience of carrying. The shutter is so simple and perfect that it cannot get out of order and is certain to work at all times. The Lense is very rapid and will photograph moving objects such as horses, animals, boats, persons walking and many other subjects too numerous to mention. The plate holder is perfection in itself and carries two plates. Extra holders can be procured at any time. We guarantee every camera to be perfect as everyone is thoroughly inspected before it is packed. Each camera is packed in a box with one double dry plate holder, (price of extra plate holders 65 cents each) sample photograph and full directions. Postage 18 cents. **Price, $3.00.**

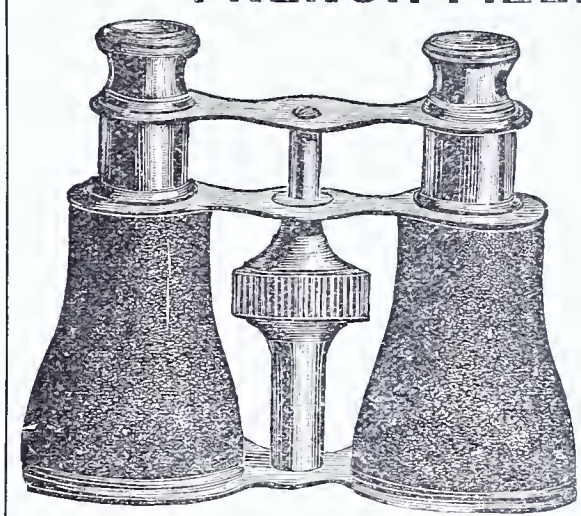
Complete Developing and Printing Outfit for Little Detective Camera.

Comprises: 1 dozen dry plates, 1 dozen sheets Sensitized Paper, 1 dozen sheets Blue Print Paper, 1 dozen Card Mounts, 1 Ruby Lamp, 2 Developing Trays, 1 Printing Frame, 1 Package Hypo-Soda, 1 bottle Developing Solution, 1 bottle Toning Solution. Cannot be sent by mail.

Price Complete, $2.00.

Only 50 cents additional and secure the "Inventive Age" one year

FRENCH FIELD GLASS.



High power field glasses have hitherto sold at prices placing them almost beyond the reach of persons of moderate means. The glasses we now offer are just what the people want, reliable glasses at low prices. Farmers, herdsmen, hunters, prospectors, sailors, travelers, tourists, and, in fact, everybody, will find them invaluable. Farmers and herdsmen can see their cattle or sheep miles away. Hunters can distinguish game at great distances, and by this means not give warning of their approach. The tourist can bring distant mountains, valleys and cities almost at his feet, while any one with these field glasses will soon become familiar with different objects that before (from their great distance) he knew nothing of. Friends and acquaintances can be recognized at great distances, and a pair of these field glasses will prove both instructive and amusing to every one. They are strongly made and cannot get out of order, but will last a lifetime. There is not a man, woman or child that cannot find use for them almost every day of their life. They are the regular standard size binoculars, elegantly covered in leather, with powerful lenses, handsome black eye pieces, and nicely nickel plated metal barrels and frame, with thumb screw extension so as to vary the focus to suit one's eyes. The glasses are enclosed in a dark leather case, lined and having a hinged cover, fastening with a strong spring lock, holding them securely when not in use. They will be found very useful at concerts, the opera, and other entertainments, bringing the performers and singers up to close range of vision. In fact a pair of these field glasses is a necessity, and at this specially low price, every one can afford to purchase. Each pair of glasses in a handsome leather case.

Postage 10c. **Price Complete, only $1.90 Each.**

With "Inventive Age" one year, $2.25

THE STAR FOUNTAIN PEN.

A solid 14 karat gold pen in highly finished hard rubber holder. The only fountain pen that will give perfect satisfaction, sold at less than $2.50. We warrant it in every particular and refund money when it is not satisfactory. A gold pen alone of the same value costs in any retail store more than we charge for the whole outfit. Writes 25 pages fools cap to one filling.

By mail, $1.50 each; $12 per dozen.

With "Inventive Age" one year, $2.

MECHANICS

DIPLOMAS AWARDED. Courses in other trades, all including thorough instruction in Mathematics and Physics. Send for FREE Circular stating subject you wish to study, to **The Correspondence School of Mechanics, Scranton, Pa.**

EDWARD P. THOMPSON,
Prof. WM. A. ANTHONY,

Solicitors of U. S. and Foreign Patents.

Consulting Engineers.

3 to 9 Beekman St., New York.

EXPERT MODEL MAKING.

Established 1867.

J. C. SEYL, Prop'r, Chicago Model Works,
179-181 E. Madison St., Chicago, Ill.
Write for catalogue.

The Best Kind of an Investment.

The price of large timber tracts in the South has increased 200 per cent in the last six years. Will increase more rapidly as tracts grow scarcer.

The Interstate Land Bureau, room 40, National Union Building, Washington, D. C., has for sale over 1,500,000 acres of timber land, in tracts from 10,000 to 300,000 acres, in Kentucky, North Carolina, Florida, Alabama, Georgia, Louisiana and Texas. Prices from $1 to $8 per acre.

Also land for colonies in Southern Maryland, Virginia, Alabama and Georgia. Good unimproved farming land in Alabama and Georgia, easy of access to markets, from $2 to $3 per acre.

Also coal land in Tennessee, Kentucky and West Virginia.

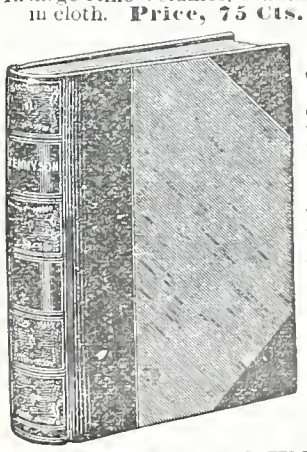
Also cheap farms in Virginia and Maryland, and choice gold mining properties in Virginia, Maryland, North Carolina and Georgia.

Also choice properties for large or small investors in and about Washington. The Bureau has reliable agents in London and Amsterdam.

WM. EDGAR ROGERS,
Sec'y and Gen'l Manager.

EXCELSIOR EDITION
— OF —
STANDARD POETS.

In large 12mo Volumes, beautifully printed, bound in cloth. **Price, 75 Cts. each** Postpaid.



This is the cheapest good edition of the foremost writers of "thoughts that breathe and words that burn" in the English language. Nobody can afford to be ignorant of the work of these great writers when they are attainable in the above descriptive dress at the price named. The illustration gives a fair idea of the shape of this edition of *Standard Poets.*

SHAKESPEARE'S WORKS COMPLETE
TENNYSON'S POETICAL WORKS.
MOORE'S POEMS.
MILTON'S POEMS.
GOLDSMITH'S WORKS.
BURNS'S POEMS.
OWEN MEREDITH'S POEMS.
SCOTT'S POETICAL WORKS.
BYRON'S POEMS.
BROWNING'S POEMS. (Mrs.)
ROBERT BROWNING.
INGELOW'S POEMS.
PROCTOR'S POEMS.
LUCILE.
FAMILIAR QUOTATIONS.
GEMS FROM THE POETS.
SACRED GEMS FROM THE POETS.
LONGFELLOW'S POEMS.
WHITTIER'S POETICAL WORKS.

The above illustration gives a fair idea of the style of this elegant edition.

75 Cents per Volume Postpaid.

☞ Any one of the above books and the INVENTIVE AGE one year, for $1.35; two books and INVENTIVE AGE one year, $1.75; three books and INVENTIVE AGE one year, $2. Address
THE INVENTIVE AGE,
Washington, D. C.

AUSTRALIA.

Fortunes are still often realized by Patenting American Inventions in that rich series of countries forming the Australian Colonies, viz., Victoria, New South Wales, South Australia, Western Australia, Queensland, New Zealand and Tasmania.

George G. Turri, Registered Patent Agent, of Melbourne who is known throughout the world as a Leader in his Profession, and has during the last 9 years obtained an unusually large number of Patents for American inventors and Patent Attorneys, may now be employed on lower terms than have ever yet been quoted. The rates have certainly never been tempting until now.

George G. Turri places approved patents (no others) effectively before Australian capitalists, with whom he is in touch, and has negotiated many highly important and profitable sales on a purely commission basis.

As delay is often Fatal to Validity, send immediate instructions naming Colonies where patent is required, and enclose one copy of full specifications and drawings to GEORGE G. TURRI, Sun Building, Queen and Bourke Streets, Melbourne, Australia. Send also $60 per Colony. See full particulars and obtain blanks (free) at INVENTIVE AGE Office, Washington. Special rates to profession. Correspondence invited.

T. H. ALEXANDER. *Attorney and Counsellor at Law.* ESTABLISHED 1857. ARTHUR E. DOWELL. *Att'y at Law, Mechanical Expert.*

ALEXANDER & DOWELL,
SOLICITORS OF PATENTS.

Rooms: 1, 2 and 3, Marble Building, 607 7th St., N. W., Washington, D. C.
Send for our Book on Patents.

And What Do You Think of This?

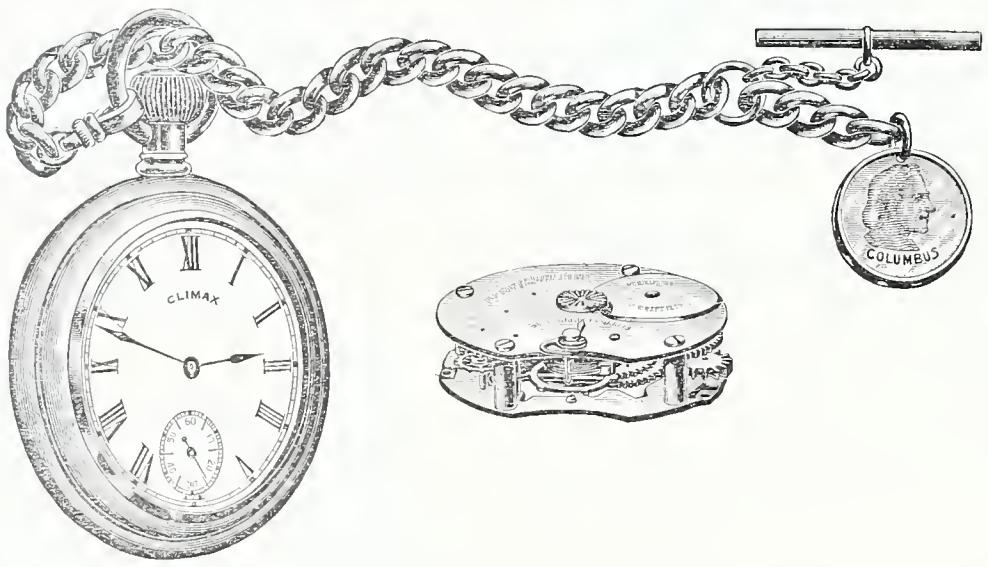
JUST OUT! BRAND NEW! ENTIRELY ORIGINAL!

$2. An American Stem-Winder.

A DUPLICATE IN QUALITY, APPEARANCE SIZE, ETC., OF ANY AMERICAN WATCH SOLD FOR LESS THAN $10.00

Our Watches are Positively and Unequivocally Guaranteed.

THE CLIMAX



EITHER ARABIC OR ROMAN DIAL.

This is the CLIMAX up to date. It represents the most important step taken in Watch evolution in many years. It describes a line beyond which nothing radical will pass for years, not only in the matter of PRICE, but QUALITY. The movement comprises many original patented features, and has been for years the subject of constant labor by one of the foremost of the foremost of expert and inventors.

DESCRIPTION.

CASES.—Two Styles, Plain and Imitation Engraved. Two Finishes, Solid Gilt and Nickel. Two Dials, Roman and Arabic. Snap Back. Heavy Bevel Crystal. Regular Stem Wind. Inside Stem Set. Regular 18 size Case. Chains assorted in each dozen.

MOVEMENT.—Regular American Lever, Lantern Pinion, Quick Train, 240 Beats per Minute, Three-quarter Plate, Short Wind, Runs 30 hours to one winding. Dust Cap over Movement.

Fully Timed and Regulated, and FULLY GUARANTEED for one year, the same as Waltham or Elgin.

The Cheapest Stem-Winding Watch Ever Produced.

PRICE $2. With "THE INVENTIVE AGE" one year, $2.50.

The Advertisers, Subscribers and Readers

Of the Inventive Age will secure neatness, dispatch and moderate prices on all kinds of printing by calling on

The Age Printing Company,

Corner 8th and H Streets, N. W.

Call us up by Telephone, 1516, and our representative will visit you, give estimates and take orders. . . .

Montague & Fuller,

Latest Improved Bookbinders' Machinery.

The Largest Line of Machinery of any House in the World.

28 Reade St., NEW YORK.
345 Dearborn St., CHICAGO.

One of the most interesting and useful books for inventors published. Elegantly bound. **Price 50 cents.**

☞ The above book and the INVENTEI AGE one year, $1.35, Address
THE INVENTIVE AGE,
Washington, D. C.

Type, Printing Presses,

- Paper Cutters and
- General Printers'
- Machinery
- And Materials.

John Ryan Foundry,

Type Founders.

Frederick and Water Streets, BALTIMORE.
ELECTROTYPING in all its Branches.

D. BALLAUF,
Practical Mechanician,

(Established 1855.)

Constructor of Light Machinery, Experimental and Model Work.

All orders for Certified Duplicates of Patent Office Models, and Models of any Foreign Patents from Drawings and Specifications, filed in the Library of the Patent Office for law suits in case of infringement; also, Original Models for Inventors, and Models to complete application for Patents, from Drawings and Specifications filed in the Patent Office.

731 7th Street, N. W., WASHINGTON, D. C.

ESTABLISHED 1857.

W. W. KIMBALL CO.

MANUFACTURERS OF

PIANOS AND ORGANS,

Highest Honors World's Fair.

60 Organs Daily. **CHICAGO.** 20 Pianos Daily

OFFICE AND WAREROOMS:
Wabash Avenue near Jackson Street.
FACTORIES: Corner 26 and Rockwell Streets.

PATENTS

Joseph Leicester Atkins,

Patents and Patent Causes.

Atlantic Building, WASHINGTON, D. C.

Sixty page book free.

NEW BOOK--JUST OUT.

How to Make and Use the Telephone.

By GEORGE H. CARY, A. M.

Illustrated with working drawings; and gives practical directions for building and operating telephone lines. Jsut the book for anybody interested in this subject. It is the latest book published, and is up to date.

Contents: CHAP. I. The Telephone. II. The Telephone Line. III. How to make Receivers of Simple Construction. IV. Batteries best suited to Telephone Work. V. Magneto Call Bells. VI. Switch-boards. VII. Telephone Troubles and How t› Remedy Them.

PRICE, Postpaid, $1.

Address, THE INVENTIVE AGE,
WASHINGTON, D. C.

CROWN FOUNTAIN AND GOLD PENS.

MEDALS AND DIPLOMAS

at COLUMBIAN EXPOSITION, Chicago.
MIDWINTER FAIR, San Francisco.

CROWN PEN CO., Manufacturers,
78 STATE STREET, CHICAGO.

W. A. PATE,

DEALER IN

Contractors' Supplies,

SHIP CHANDLERY AND
MARINE HARDWARE, . .

Blocks, Cordage, Machinists' and Engineer's Supplies,

HARNESS,

20 Tenth St., Corner of C Street Northwest,
WASHINGTON, D. C.

AGENTS $75 A WEEK AT HOME, using or selling **PRACTICAL PLATING DYNAMO.** The modern method, used in all factories to plate new goods. Plates gold, silver, nickel, etc, on watches, jewelry, table-ware, bicycles and all metal goods; fine outfits for agents; different sizes; always ready; no battery; no toy; no experience; no limit to plating needed; a great money maker.

W. P. HARRISON & CO., Clerk No. 15, Columbus, Ohio.

FREDERICK CARL,

Successor to E. H. BRADFORD.

Model Maker,

Expert in Perfect Working Models,

Designing, Drafting and Perfect Working Models for Inventors. Models made from sketches, Patent Office drawings or home-made models. Duplicates made of Patent Office models for law suits in case of infringement. Patterns made from wood and metal. Manufacturing of Novelties.

711 G Street, opposite U. S. Patent Office,
WASHINGTON, D. C.

THE

Railroad Car Journal

IS THE ONLY

publication in the world devoted exclusively to the construction, maintenance and interchange of Railroad Car Equipment. A Journal for Superintendent of Car Department, Foreman, Inspector and Repairer; and especially for inventors of car appliances. Subscription ONE DOLLAR per year. Sample Copy Gratis.

617 Vanderbilt Building, NEW YORK.

Andrew B. Graham,

LITHOGRAPHER

Diplomas,
Bill=Heads,
Bonds,
Letter= Heads,
Checks,
Cards,
Drafts,
Notes,
Certificates of Stock, &c.

- All kinds of Commercial and
- Color Work Skillfully Execu=
- ted, and Perfect Satisfaction
- Guaranteed . . . . .

Photo=Lithographing

of Maps, Plats and Sub-divisions . . .

1230 Pennsylvania Avenue,

Washington, D. C.

Telephone 1031.

The National Capital,

PAST AND PRESENT.

Stilson Huchins' Great Book.

CONTAINS 268 PAGES AND 136 ILLUSTRATIONS.

Elegantly printed and bound. Suitable for Library or center table. One of the best works of the kind ever issued.

Should be in every house in America.

HOW TO OBTAIN IT: Send $1.35 and receive the "INVENTIVE AGE" one year and "Picturesque Washington" postage paid.

The Washington National Building and Loan Association,

Ohio National Bank Building, Washington, D. C.

Par value of shares $100, and the holder draws that amount in cash at maturity, estimated at seven to eight years time. Cost is 60 cents monthly or $100 in advance. On the latter *cash dividends* are paid semi-annually, *at 6 per cent per annum* on the amount paid in the first two years and 8 per cent per annum thereafter. Stock can be withdrawn any time after three and six months with 6 per cent and after two years with 8 per cent. *Unexcelled as a method of saving small or investing large sums.*

CORRESPONDENCE SOLICITED.

Hon. JOSEPH D. TAYLOR, *President.* W. F. JOHNSON, *Gen'l Manager.*

GEO. S. DOREMUS. FRANK C. JUST.

Doremus & Just.

414 Eleventh St., Star Building,

WASHINGTON, D. C.

All kinds of screw machine work. Bicycles built to order, repaired, nickle plated and enameled with baked enamel. Gold, silver, nickel, copper and bronze plater.

Model Makers, Manufacturers of Patented Novelties and Electric Supplies.

CHANDELIERS REFINISHED IN THE LATEST STYLES.

OUT OF TOWN WORK SOLICITED.

Shoes to measure, $5.

We will make to your measure a Russet or Black Shoe in any shape or style you may select for $5. We guarantee leather, workmanship and fit. You can't buy it any cheaper ready made. Drop in at once and let us measure your feet.

WILSON,
929 F Street.

GATCHEL & TOMPKINS,

Tailors and Importers,

418 12th STREET, N. W.,
WASHINGTON, D. C.

WM. DUFFY,

REGISTERED

Plumber and Gas Fitter,

1130 N. CAPITOL ST.,

WASHINGTON, D. C.

ESTIMATES FURNISHED

Orders by mail will receive prompt attention.

EVERYBODY WANTS THE
LIVE STOCK JOURNAL
And our WORLD'S FAIR 50c.
PREMIUM SPRING CURRY COMB
FREE to Every Subscriber.
$1.10 A YEAR.
Write for FREE SAMPLE COPY.
Liberal Cash Commission to Agents.
Western Agriculturist and Live Stock Journal,
334 Dearborn St., Chicago, Ill., or
QUINCY, ILLINOIS.

NOW READY.

An Entirely New and Practical Work on Patents.

PATENT OFFICE MANUAL,

Including the Law and Practice of Cases in the United States Patent Office and the Courts Holding a Revisory Relation Thereto. Also, an Appendix of Copyright Decisions, Etc.. by GEORGE H. KNIGHT.

I. The Patent Franchise.
II. Decisions Relating to Patents for Inventions.
III. Decisions Relating to Patents for Designs.
IV. Decisions Relating to Trade-marks and Labels.
APPENDIX A. Copyrights.
APPENDIX B. Foreign Patents.
Table of Cases.

One Vol. 8vo. Law Sheep. Price $5.00 net.

LITTLE, BROWN & COMPANY,
PUBLISHERS.
254 WASHINGTON STREET, BOSTON.

Magnolia Metal

IN USE BY

Eight Leading Governments.

Best Anti-Friction Metal for . .

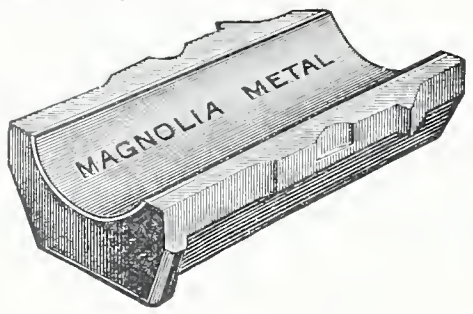
High Speed Engine, Dynamo, Rolling-Mill, Steamship, Railroad, Saw-Mill Cotton-Mill, Paper-Mill, Woolen-Mill, Silk-Mill, Jute-Mill, Rubber-Mill Sugar-Mill, Flour-Mill and all Machinery Bearings

MAGNOLIA METAL COMPANY.

Owners and Sole Manufacturers.

74 Cortlandt St., N. Y.

London Office: 75 Queen Victoria St.
Chicago Office: 51 Traders Building.



It is no Experiment

When you have your Engraving, Stereotyping or Electrotyping furnished by us.

We make relief line plates for printing purposes by every known process and we guarantee them to be the best in the market.

Let us estimate on the next order you have. Prices and plates will suit you.

Our specialty Half-tones on hard rolled copper.

The Maurice Joyce Engraving Co.

414 11th Street, N. W.,
Star Building,
WASHINGTON, D. C.

Mason, Fenwick & Lawrence,

PATENT LAWYERS,

Solicitors and Experts.

602 F St., Washington, D. C.

Established 1861.

References: Dr. Jas. C. Welling, President Columbian University, Washington, D. C.; Hon. John T. Morgan, Hon. John T. Heard, Gen. W. S. Rosecrans and many others.

24 Page Book Free.

J. SCHULTZBACH,

Mechanician and Model Maker,

Models for Patents and Experiments.

Electrical and Meteorological Instruments and light machinery of every description made to order.

713 6th St., N. W., WASHINGTON, D. C.

T. E. CABELL,

CONTRACTOR AND BUILDER,

Cabinet Work a Specialty. Jobbing done Promptly. Estimates for Buildings Furnished. Work Contracted for on the Best Terms. Charges Moderate.

1121 1st Street, N. W., WASHINGTON, D. C.

THE WASHINGTON LOAN AND TRUST CO.

FIRE-PROOF GRANITE BUILDING.

PAID-UP CAPITAL $1,000,000.

Organized under act of Congress and under the supervision of the U. S. Government.

Furnishes first-class investments.
Executes trusts. Loans money.
Pays interest on deposits.
Rents office rooms and safe deposit boxes.

OFFICERS.

JNO. JOY EDSON, President.
JNO. A. SWOPE, Vice-President.
JNO. R. CARMODY, Treasurer.
ANDREW PARKER, Secretary.

ENGRAVING AND PRINTING. BLANK BOOKS MADE TO ORDER.

MERCANTILE STATIONERY.
CARD BOARDS.
TAGS AND GUM LABELS.
INVOICE AND STUB FILES.
PRINTING AND BINDING.

Easton & Rupp,

Dealers in

Blank Books, Paper and Envelopes, Wrapping Paper, Twines, &c.

421 Eleventh Street, N. W.,
WASHINGTON, D. C.

This is an Electrical Era . . .

Giant strides are being taken in the application of electricity to all purposes. It is the agent that will transmit the power of Niagara to the principal eastern cities. As copper is the only metal used to conduct electrical currents, its consumption is increasing rapidly and price advancing. Investments in copper mines, always immensely profitable, are becoming constantly more attractive. The opportunity to secure stock in one at ground floor is not to be overlooked. We offer, subject to prior sale, 50,000 shares of Treasury Stock in the

San Fernando Copper Mining and Smelting Company

At ten cents per share to provide funds with which to prosecute development. After this allotment is sold the price will be advanced and a sufficient amount disposed of to erect a matte furnace to treat ores at the mine.

The San Fernando Copper Mine

Has produced $500,000 and scarcely touched its ore reserves, already blocked out. The vein is a true fissure, averaging over six feet in thickness, all of which is pay, and is opened up at points for 1,200 feet in length. We believe there is scarcely a limit to the dividends which can be paid with systematic development.

Do not miss the opportunity to secure some of this stock at present low price. On subscriptions for 500 shares or over, we will accept one-half cash, one-fourth in thirty days, and one-fourth in sixty days. Prospectus and full particulars furnished on application. Address all orders and communications to

THE WOODS INVESTMENT CO.,
Official Brokers,
Colorado Springs, Col.

REFER TO
The Victor Banking Co., Victor, Col.
Any Bank in Colorado Springs, or
Denver, Col.

"Within the Golden Circle," a handsomely illustrated brochure relative to the famous Cripple Creek Mining District mailed free upon request.

In answering this please mention THE INVENTIVE AGE.

S. H. Hines, ...

MAIN OFFICE:
423 G Street, N. W.

BRANCH OFFICE:
910 4½ Street, N. W.,

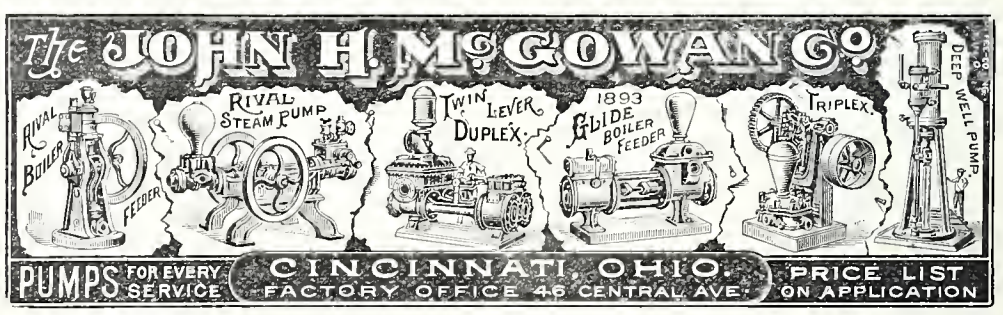
Telephone 775. WASHINGTON, D. C.

Undertaker and Embalmer.

Twenty years experience in the business. First class work guaranteed at reasonable prices.

Arrangements can be made with us by telegram for funerals in any city or town in the United States or for transfering bodies from one city to another. Open day and night through the year.

S. H. HINES, President of the Peoples Co-Operative Burial Association, D. C.



The Norris Peters Company,

Photo-Lithographers,

458-460 Penn. Avenue, Washington, D. C.

Special attention given to the reproduction and printing of copies on parchment, drawing-paper, tracing-linen, and cardboard, of Patent Office drawings for attorneys to accompany application for patents in foreign countries.

The Inventive Age
AND INDUSTRIAL REVIEW
A JOURNAL OF MANUFACTURING INDUSTRY AND SCIENTIFIC PROGRESS

Sixth Year. No. 3. | WASHINGTON, D. C., MARCH, 1895. | Single Copies 10 Cents. $1 Per Year.

BALTIMORE & OHIO.

The Pioneer Railroad—Interesting Sketch of Its Origin and Progress.

Looking no farther backward than a part of the present century, the progress of railroad invention eads like a story of incredible imagination, were it not that its literal presence of wonderful advancement makes itself practically felt before the world every day. No one now, keeping himself abreast of the times, would ever presume on incredulity when confronted with even the wildest dream of railroad advancement in this fast marching 19th century, in view of what one already knows of its past marvels of progress. The principal of evolution is a good one—the best on earth—and it holds as good in railroading as in man.

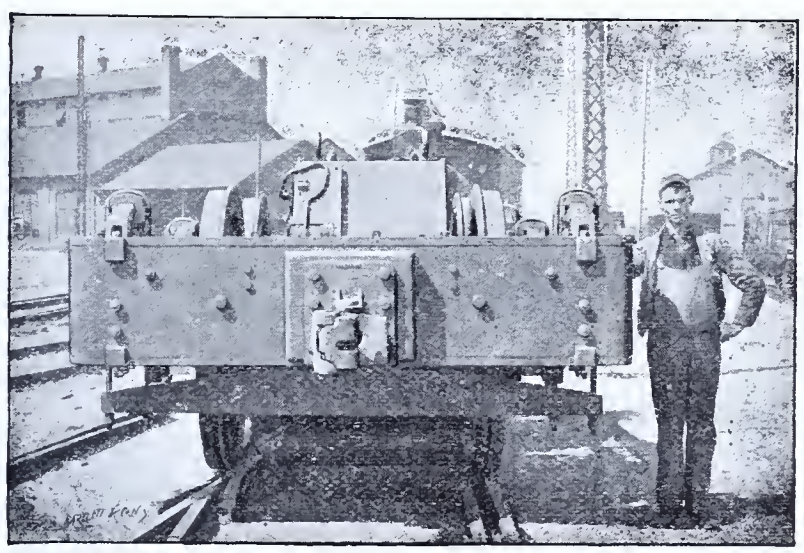


FIG. 1.

Take the history of the Baltimore & Ohio road, the great American pioneer, whose remarkable evolution is made tangibly interesting by illustrations here given, of its growth since its small beginning of but thirteen miles long. A railroad vertebra 13 miles long, so to speak, evolved into a well nigh perfect system of two thousand miles; with gigantic arms reaching into nine different states, a vital power of nearly nine hundred locomotives and a still growing capacity of twenty thousand cars.

The history of the Baltimore & Ohio is certainly an object lesson of 19th century progress. It is the oldest chartered railroad in America, and the oldest passenger railroad in the world. On the 4th of July, 1828, ground was broken for the promising enterprise by Charles Carroll, of Carrollton, the only remaining signer of the Declaration of Independence. At that time it was only designed for a horse railroad, for steam had not yet been evolved into a practical motive power. It was the original intention to extend the road ultimately to the Ohio river, hence the name which it now bears was given to it at its beginning.

On the 22d of May, 1830, the road was opened for business from Baltimore to Ellicott's Mills, thirteen miles. The first American passenger car then used, of which a cut is given, was almost twelve feet long; one horse was attached, good for eight miles an hour, carrying twenty-five passengers. The driver sat in front, the conductor stood on the steps behind. Many old timers remember the old Relay Station where horses were changed and yarns spun of the wonderful new railroad. The first driver, Mr. Galloway, who was afterward made engineer, lived to see the road perfected from the primitive one horse power to its climax of wonderful display at the World's Fair, where he held forth with pride as the first engineer of the first passenger railway in America.

Very soon after the road was started, a more ambitious car was used, known as the "double-decker" which speaks for its own upward progress in the illustrations. Then a tread car was introduced—the object being for the horse to move its own car and passenger car attached at the same time; a sort of animated four-legged locomotive, which is doubtless more humorous to read about than it would be to ride behind, particularly in this day of lightning speed.

Momentous events followed quickly on this new road, and on August 28, 1830, the first American locomotive ever constructed, made by Peter Cooper, drew the first passenger car ever propelled by steam upon any railroad in the world, Mr. Cooper acting as engineer. In illustration it does not loom up as anything very ambitious in comparison to the great electric motor, but it was a big thing on rails in those days. It is related of the famous good old Peter Cooper that at that time becoming elated at the speed of his engine, he took to racing with a horse and wagon, and pulling the throttle in haste he unmercifully jammed his finger, and those who were near to hear say the air was blue; not with smoke. Such is not so difficult to believe of any one of the genus homo—except Peter Cooper.

Many experiments were made upon this line, among them the plan of running cars by sails. The engines were what is known as the "Grasshoppers," having walking beams like a steamboat, but as yet they seem to have evolved no farther than as the cut shows, and the Grasshopper still remains "as idle as a painted ship" upon a first-class railway! Great things were hoped at one time from magnetic attraction as a motive power; for the Baltimore & Ohio from its inception has been a road of advanced thought in its management; but the times then were not ripe for this new wonder of motive power, which is only now beginning to take practical form in the brain of scientists. This characteristic policy of progress and improvement demonstrates what may be possible to the road in the future, it having already adopted electric motors in its great tunnel just completed; and those of the next century may relate even more marvelous advancement than this century has chronicled of its wonderful growth from crude beginning.

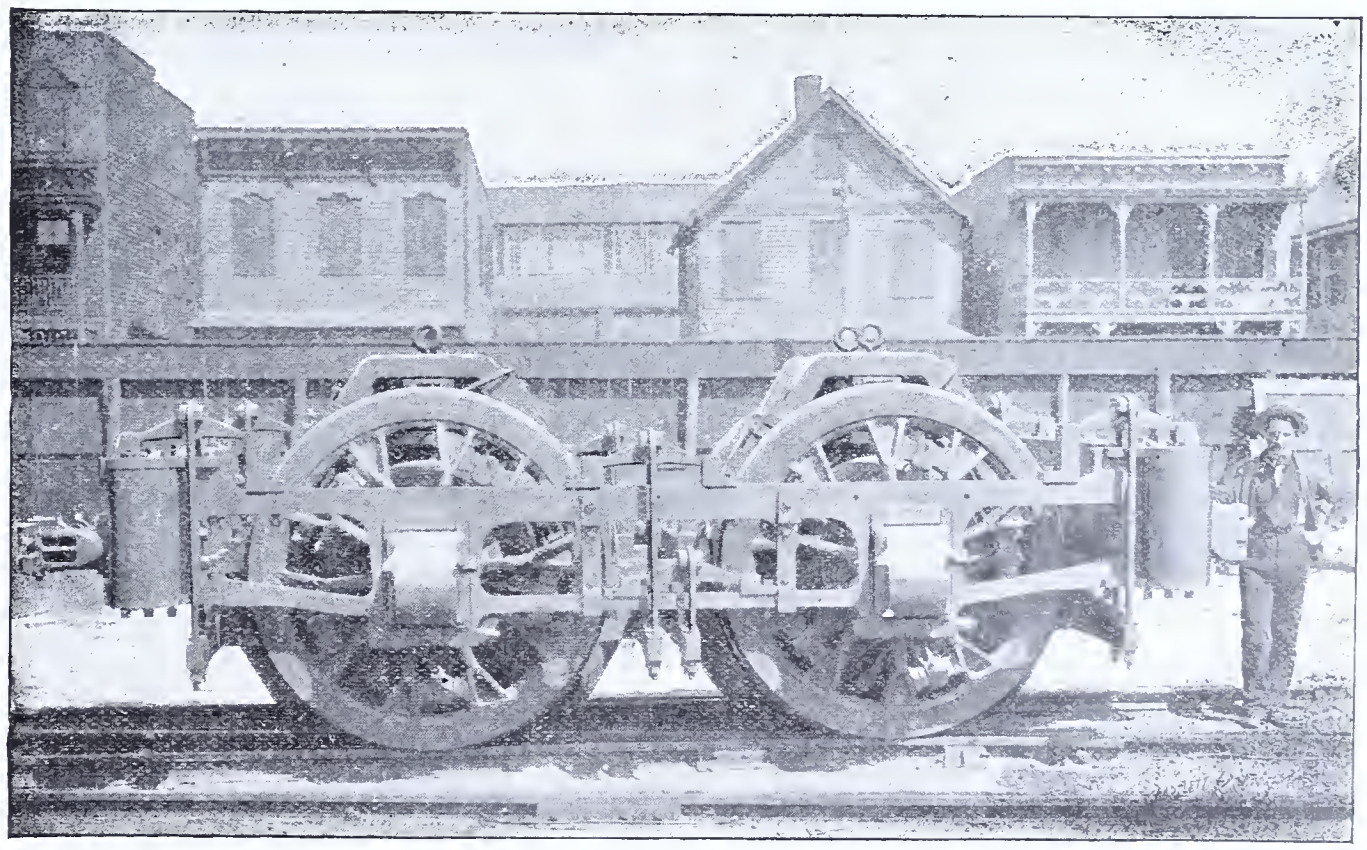


FIG. 2.

The last achievment of the road has been the opening of the great belt tunnel, traveling under the busy city of Baltimore; the first tunnel ever

(*Continued on page 44.*)

The Inventive Age

Established 1889.

INVENTIVE AGE PUBLISHING CO.,

8th and H Sts., Washington, D. C.

ALEX. S. CAPEHART. MARSHALL H. JEWELL.

The INVENTIVE AGE is sent, postage prepaid, to any address in the United States, Canada or Mexico for $1 a year; to any other country, postage prepaid, $1.50. All subscriptions stopped at expiration of term.

Correspondence with inventors, mechanics, manufacturers, scientists and others is invited. The columns of this journal are open for the discussion of such subjects as are of general interest to its readers.

Technical matter is particularly desired. We want practical information from practical men.

Nothing will be published in the editorial columns for pay.

The INVENTIVE AGE is thoroughly independent.

Advertising rates made known on application. Special facilities for furnishing cuts of any patented article together with descriptive article. Business specials 25 cents a line each insertion, 7 words to the line. No advertisement less than 50 cents.

Address all communications to THE INVENTIVE AGE, Washington, D. C.

Entered at the Postoffice in Washington as second-class matter.

WASHINGTON, D. C., MARCH, 1895.

IN these days of inventive progress, THE INVENTIVE AGE calls attention of its readers to the fact that there is a field open to inventive genius along the lines of electric street car brakes. There is no doubt that there is a chance for practical improvement over the present system.

IT is with some degree of pride that THE INVENTIVE AGE takes in receiving many letters of congratulations from its readers in all parts of the world. It takes this occasion to thank the writers of them for the kind words spoken and will say that in the future, as in the past, the AGE will go on in its work of exposing frauds, no matter where its arrows strike.

IN the death of Fred Douglass, which took place at his home in Anacostia on the 18th inst., one more of the prominent figures of slavery times has gone. Mr. Douglass occupied the exalted position of his race in the fact that he commanded the respect of the leaders of all political parties. He was a man of culture as well as a man of decided opinions, and his name on the pages of history will testify as to his political and social life.

A magazine like THE INVENTIVE AGE, that is not published in the interest of any firm or corporation reaches more consumers then any other medium through which you can advertise. It brings the inventors and the manufacturer together. It reaches the homes and the workshops, the office and the mill. This kind of magazine attracts the intelligent reading public and those are the people you are desirous of reaching with your advertisements. If you will try our columns we will make it profitable and interesting to you.

THE average man of the day is, at the present time, engaged on the problem of life to such a degree that he almost begins to wish that even the absolute free coinage of silver would take a forward move to such an extent that it would become a tangible fact instead of a political factor. One can almost say like the prophet of old: "Deliver us, good Lord! Deliver us from the hands of our friends!" It looks as if Congress, instead of legislating for the wants of the people, resolved itself into a town meeting for the sole purpose of crimination and recrimination, and, after spending hours, days and months in this kind of useless rot, finally, with an owl-like wisdom and a self-satisfied air, accomplished the old story of having "marched up hill, and down again," and adjourned, not for their own financial good but by virtue of limitation for the country's good. In the language of the psalmist, we all say, "The Lord be praised."

THE government board of management for the Atlanta Exposition has paid a just tribute to the worth and work of Mr. J. E. Johnson, who so ably represented the colored press at the Chicago Exposition in 1892, by appointing him special agent to prepare for exhibition the inventions of the colored race which are now on file in the United States Patent Office. It is understood that Mr. Johnson will publish fac-similes of the colored people's inventions and endeavor to interest the capital of his race in their manufacture. He will also have working models of these inventions while the Exposition is in progress. There has been a great deal written in relation to the problem of the colored people, but, regardless of what may be said to the contrary, they are settling the question for themselves. They are taking advanced positions in literature, art and inventions, and along the lines of progress they are demonstrating their capabilities to cope with their future. When it is taken into consideration that it is comparatively a short period of time since they were in slavery without opportunities of any kind, surely their advancement is marvelous.

THE INVENTIVE AGE offers the suggestion to the various houses that issue the many beautifully illustrated catalogues, the feasibility of uniformity in size. If those interested would but for a moment realize the fact that there are a great number of these catalogues that are valuable as books of reference and that there are a great number of people, as well, who desire to preserve them, it will be easily understood that it would be to the interests of publishers to have them of uniform size so that they could be bound in book form, thus making a valuable encyclopedia of the manifold interests to be obtained from the many different descriptive catalogues issued every year—take for instance seed catalogues, there are very many of these works of art. Again, there is the photographic supply catalogue and the many machinery catalogues, in fact, volumes of the most artistic as well as educational catalogues issued that would make libraries of valuable knowledge that could soon be accumulated in this way if they were made of uniform size, so that they could be bound as suggested. The printers throughout the country could be of valuable assistance in thus urging upon their patrons the vast amount of real benefits to be derived from uniformity of size in catalogues.

Important Invention.

The age in which we live has been properly styled the "golden age," but it should now be called the age of electricity, though we have as yet seen this subtle fluid applied in its crudest form. Inventive genius has given to the world new marvels never before dreamed of. Witness the telegraph, the kinetoscope, the graphophone and we might add the phonograph. While many electric appliances have proved useful, only a few are yet commercially available, yet this truly demonstrates the wonderful possibilities still latent in that force so little understood. A stride is being made to put electricity far in advance of its present state of usefulness never before dreamed of. Among the latest applications is a method that prevents corrosion and fouling of ships in sea water. By a certain electric process marine accumulation is removed from bottoms of ships without dry docking the vessel. The adjustment of this system to all class of vessels might seem expensive, but it is available and would be cheap at any price. Vigilant eyes are watching the process of this invention in every country. Germany is watching with earnest solicitude, and has a large syndicate ready to take hold of it. This syndicate has $2,000,000 capital to start with, and a New York and London company consider this enterprise of the very first importance, as they offer to furnish capital to develop the system. The companies in the south have signified their desire to take an interest as soon as opportunity is offered.

In this connection it is proper to say that the solution of this difficult problem was analyzed by a Kentuckian whose name is withheld for the present, but is known at this office. Foreign papers have also commented upon his discovery and regard the invention important and of great value.

CARLEY, & VAN BUREN & Co., of N. J., in their masterful views of the financial situation as expressed through their daily bulletins have not only been characteristic of the firm spoken of but have, to a high degree, been in touch with the general public, and in their last circular letter touched the acme of their well deserved reputation as financiers of keen foresight. And now that Congress has so ignobly failed to meet the expectations of the country, these gentlemen are to be congratulated.

Report of Commissioner of Patents.

The report of the Commissioner of Patents to the Congress, dated January 31, 1895, for the year ending December 31, 1894, shows an excellent condition of the business of the Patent Office. As to the number of applications received, patents allowed, etc., the report is as follows, to-wit:

"In 1894 there were received 36,987 applications for patents; 1,357 applications for designs; 95 applications for reissues; 2,286 caveats; 2,053 applications for registration of trade marks, and 371 applications for labels. There were 20,803 patents granted, including designs; 64 patents reissued, and 1,806 trade marks registered. The number of patents which expired was 12,920. The number of patents which were by operation of law forfeited for non-payment of the final fee was 3,812. The total expenditures were $1,100,047.12. The receipts over expenditures were $87,392.46, and the total balance to the credit of the Patent Office in the Treasury of the United States amounts to $4,369,135.91.

"In proportion to population more patents were issued to citizens of Connecticut than to those of any other State—one to every 993 inhabitants—and next in order, according to population, come Massachusetts with one to every 1,335; the District of Columbia with one to every 1,379; New Jersey with one to every 1,557; Montana with one to every 1,738; New York with one to every 1,801, and Colorado with one to every 1,991. The States to whose citizens fewest patents were granted in proportion to the number of inhabitants are South Carolina, one to every 25,581; Mississippi, one to every 21,857; North Carolina, one to every 18,597; Arkansas, one to every 19,793, and Georgia, one to every 16,703. Some were issued to citizens of every State and territory in the Union.

"As to foreign countries, more were granted to subjects of England than of any other—689; to those of Germany, 582; of the Dominion of Canada, 293; of France, 196; some to subjects of Austria-Hungary, Belgium, China, Cuba, Denmark, Finland, Hawaii, India, Ireland, Italy, Mexico, Netherlands, New South Wales, New Zealand, Norway, Queensland, Russia, Scotland, Servia, South Australia, Spain, Sweden, Switzerland, Venezuela, and Victoria, and one each to citizens, respectively, of British Guiana, Chile, Colombia, Ecuador, Guatemala, Natal, New Providence, Peru and Porto Rico."

The total receipts were $1,187,439.58 and expenditures $1,100,047.12; receipts over expenditures $87,392.46. It appears from the report that there is a balance in the Treasury of the United States on account of the patent fund of $4,369,135.91. This money is not actually there, separate from other moneys in the Treasury. What is meant by this so-called balance is, that if the surplus money earned by the Patent Office since 1868 was retained in a separate fund there would be a fund to the credit of the Office of $4,369,135.91.

The Office received for action not only the 40,492 original applications for patents, for designs, for reissues, and for the registration of trade marks, but received also 85,422 amendments of applications and other writings from applicants which put the cases to which they appertained into condition for further action by the Office in the nature of re-examination.

An average of 711 original cases was received a week, and an average of 1,642 amended cases each week. On the 31st day of December, 1894, there were pending in the Office 2,273 new applications not acted on and 2,180 amended cases not acted on, a total of 4,453.

None of the thirty-three examining divisions in the Office was in arrears more than one month, either on new applications or on amended work, and this means that any application for a patent filed complete and in such form as that the subject-matter may be understood receives action upon the merits within one month of the filing date.

The report calls attention to the cases of unwarrantable delay of some applicants in not prosecuting their applications, with the information that the Commissioner of Patents has established several new rules designed to correct this practice. The Commissioner also recommended to the Congress an appropriation to establish a classification division. A classification has been made by the separate examination divisions and from time to time revised; but it has defects which require for their correction an exhaustive review of the whole ground. The Senate adopted the recommendation and inserted an amendment to appropriate the money to establish a classification division, but in conference with the House of Representatives, the Senate receded from its amendment and it was struck out of the appropriation bill.

The Commissioner also recommended that the appropriation for the scientific library be increased from $2,000 to $10.000, but without avail.

Each of the latter recommendations should have been adopted, and the hope is expressed that the next Congress may find itself able to make the increases in the appropriation for the Patent Office.

Inventions in the Wool Manufacture.

By S. N. D. North.

[Read before the American Association of Inventors and Manufacturers at Washington, D. C., January 15, 1895.]

In treating this subject, I shall confine myself wholly to the inventions made in wool manufacturing during the 19th century, and in the United States. Even with these limitations, the subject covers almost the entire field of mechanical wool manufacturing, which was in its essence re-invented in this country. You are all well aware of the circumstnaces which made this necessary. Up to the year 1794, wool manufacturing, as conducted in the United States, was purely a hand manufacture, and confined almost wholly to the household.

For many years prior it was vaguely realized in the United States that the world was upon the eve of a new and strange industrial developement, from participation in which this country seemed to be excluded by laws destined to keep it industrially independent. Tench Coxe states that he first became aware in 1786 that labor saving machinery for spinning was being largely used in Great Britain, and he then made successful efforts to obtain models of these machines. The mother country, thoroughly awake by this time to the significance of the textile inventions of her citizens, had passed laws by which she hoped to retain the monopoly of the rich harvest their ingenuity promised. The first of these statutes, enacted in 1774, a few years after Arkwright's successful inauguration of the factory system with his new appliances, was entitled " An act to prevent the exportation to foreign parts of the utensils made use of in the cotton, linen, woolen and silk manufactures of this kingdom"; and its purpose, as set forth in the preamble, was, "to preserve as much as possible, to his Majesty's British subjects the benefits arising from these great and valuable branches of trade and commerce." The statute prohibited, under penalties of forfeiture and heavy fines, "the putting on board of any ship or vessel, not bound to some port or place in Great Britain or Ireland, of any tools or utensils commonly used or proper for the preparation, working up, or finishing of the cotton, woolen, silk or linen manufacture." Another statute, even more stringent, was enacted in 1781, by which a year's imprisonment was added to the penalties of forfeiture and the fine of £200 previously imposed. This policy was vigorously enforced, notwithstanding some modifications of the law in 1825, and again in 1833, until the year 1845, when machinery for the textile manufactures was for the first time omitted from the list of prohibited exports.

No known instance occured during the earlier decades of the enforcement of these laws, in which a perfect textile machine was smuggled into this country. Some few models were clandestinely introduced, but they were of so imperfect a character that it may literally be said that the United States was compelled to invent anew the machinery with which, gradually, and after a most trying probation, her textile industries were finally established. The more remarkable is it therefore that this country learned so quickly how to clothe itself, and maintained and developed a great woolen industry in the face of a nation which had such a tremendous start in the race.

No circumstances could have afforded a greater incentive to the inventive faculty of a young and ambitious people. Very soon it was at work; very rapidly it traversed the ground already covered in England; and very naturally it has happened that the inventors of the United States have supplied the world with many of the most important of the inventions which have accelerated the developement of the textile arts.

The carding of wool is the initial step in its manufacture, and the inauguration of the machine manufacture of wool is commonly associated with the first carding machine, run by water-power, built in the United States. This machine was erected at Byfield, Mass. in 1794, by John and Arthur Scholfield, and built by these two Yorkshire immigrants from models constructed from memory, as the result of their observations in England, precisely as Samuel Slater built the first American cotton spinning frame. It was not therefore an invention, properly speaking; but it was the basis upon which subsequent inventors builded, here a little and there a little, until we have now in this country a type of carding machine, different from that employed anywhere else, and recognized as indigenous to America. As distinguished from the English machine, it has certain acknowledged advantages in limited lines of work.

But the carding machine of all countries owe the chief improvement over the machine of a century ago to an American inventor, John Goulding, of Worcester, Mass., whose patent was dated in 1826. Before Goulding's invention, the rolls or roving issuing from the carding machine were limited to the breadth of the card; the ends of the separate rolls had then to be spliced together, by hand, or by a machine known as the billy. Just what the new invention accomplished has been concisely stated in a judicial opinion which affirmed the validity of the patent after years of litigation:

"Goulding aimed to dispense with the billy altogether, and sought to accomplish with four machines what had previously required the use of five; and the evidence shows beyond controversy that the invention enabled manufacturers to produce yarn from wool at much less cost, of better quality, and in better quantity than was produced by the old process. His purpose, also, was to dispense with short rolls, and to introduce the long or endless roll in its place. Years were spent by him in experiments to accomplish these purposes; but the result was that he was successful. He dispensed altogether with the billy, and, by a new combination of old devices, he obtained the endless roll, and so perfected his machinery that he could use it successfully from the moment the roving left the delivery end of the first breaker, till it was converted into yarn fit to be manufacured into cloth."

Monsieur Alcan, the distinguished French writer, describes the invention as the most important advance in the wool manufacture of the eigthteenth century. "It was not a step, but a flight," was the enthusiastic language of a distinguished manufacturer. Certainly nothing of equal importance has since been achieved.

The modern card does not differ essentially from that in use sixty years ago, except in its larger capacity and the more perfect construction in parts. But there have been many attachments invented which add immensely to its efficiency. Notable among these, of American invention, is the Bramwell feeder, first introducted in 1878, and the forerunner of a large number of automatic first breaker feeders. These feeders weigh the wool as it passes into the machine, mix it automatically, throw out much of the refuse left in scouring, and enable a set of cards to turn out from 25 to 40 per cent more work than was possible by hand feeding. An additional series of ingenious devices for transferring the silver automatically from one breaker to the other and thence to the finisher, have enormously increased the productive capacity of a set of cards, and at the same time reduced by more than one half the amount of manual labor required to equip the card room of a large woolen mill.

Fifty pounds of clean wool a day was a fair average for set of cards twenty-five years ago. This average has now been increased to 100, 150, and even 200 pounds a day, according to the width of the machine and its cylinders, and the character and quality of the materials employed.

In the perfecting of these minor improvements, a number of American inventors have materially contributed. In the boldness with which we have enlarged the machines, to increase their capacity, I believe we are in advance of any other nation. The machine as it now stands appears to accomplish everything that is possible to expect of a mechanism at once so delicate and so cumbersome.

Not so much can be said of the wool spinning machinery, although in this deparment also the advance, particularly in the last twenty-five years, has been extraordinary. The first spinning jack operated in this country of which I have knowledge was placed in the Peacedale Factory of the Messrs. Hazard in 1819, and contained 53 spindles. At the end of thirty years, Mr. Rowland Hazard, senior, impressed by the advance which had occurred under his own eye, wrote of "The stripling who tended two highly improved jennies, from which he turned off as much yarn daily as 600 or 700 women formerly spun off hand-wheels in the same time." Forty years more have elapsed, and the productive capacity of the single operative has been more than doubled in the second interval.

There have been no radical changes in the method of spinning woolen yarn since the adoption of the self-acting mule, although improvements in the mechanism have perceptibly increased the efficiency of the machinery. In all American mills down to the close of the civil war, the spinning continued to be done on the hand-jack. In this respect, American mills were some twenty-five years behind those of Great Britain. Automatic mules of English make were imported, and their use attempted, but not with satisfactory results. The English machines, being adapted to spinning uniform numbers, were ill suited to the needs of the American manufacturers at that time, compelled as he was to use yarns of different numbers adapted to a variety of products. Several American inventors, working independently, succeeded in so far perfecting the self-operating mule that a number of different patterns were introduced about the same time. Seth D. Paul adapted the Sharp & Robert English pattern of cotton mule to the work of spinning wool. The Saco Water Power Machine Co., built a pair of these mules for the Weybosset Mills in 1865, which were successfully operated for many years. Johnson & Bassett of Worcester equipped the Chase mill in Webster. Mass., in 1868. Two years earlier, Oliver and William Brothers, of Burlington, Vt., two hand spinners, perfected a self-operating jack attachment which was successfully utilized both at Burlington and at Dedham Mass. There were still other machines the date of the invention of which was about this period. The wool manufacture appears to have suddenly awakened to the fact that in the spinning of yarn it was lagging inexcusably behind the times, particularly in contrast with the cotton industry. Yet so conservative were the manufacturers, so distrustful were they of the feasibility of a self-operating jack, that years elapsed before its introduction became general, and the hand-jack is still to be found in some of the small mills of the interior.

From the successful application of power to mule spinning—which as we have seen was accomplished independently by several American inventors about the same time, and independently of the English machines then in operation abroad,—I date the commencement of wool manufacturing in the United States on a scale and by methods which entitle it to rank with the industry in the chief European manufacturing countries. It put an end to that class of operatives known as hand-spinners, from which the manufacturers had suffered an amount of inconvenience and annoyance, hard to realize even in these days of highly organized labor bodies.

The gain in productive capacity was most striking. The increased production of yarn from the same number of spindles was from 40 to 60 per cent, according to the grades spun. The decrease in the cost per pound of spinning, as contrasted with the old hand-jack, was more than 50 per cent. There is also great saving in the amout of waste, and a still greater gain in the uniformity and quality of the product.

(*Completed next month*).

The Keeley Motor.

The eyes of scientists have many years been turned toward Keeley with his long promised "vibratory system" of power; some with faith, some with derision; but all with a full fledged curiosity that always follows in the wake of any newly announced great discoveries. Whether this founder of a new school of science lives to see the work he has already accomplished made practicable as applied to commerce is doubtful, but there is little doubt in the minds of all believers in an advanced science, that the next century will demonstrate the much scorned claims of Keeley regarding the power of "sympathetic negative attraction" as practical and his wonderfully formed sympathetic vibratory machinery may surplant the ponderous machinery of today.

The world shows fragmentary proof that every age has had its peculiar characteristics, but many students of history are now believing that thought, ideas, inventions are but reoccurrences of mental processes that filled the lives of a forgotten past, and that the overwhelming wonders of electricity from which the vibratory system is deducted, and upon whose dazzling brink the world is now trembling before greater discoveries than is yet known by our civilization, were a part of man's knowledge in the past, now again returning in process of mental advancement.

It has been anounced by several well known scientists of Philadelphia as their opinion that the Keeley system is the opening way to the solution of the difficulties of safe navigation of air. This system of ærial navigation is now said to be completed, and when the world sees this machinery attached practically to the very "wheel works of nature," and air ships plowing the atmosphere with as much safety as our engines plunge over the land, all unbelief and curiosity will have turned to an every day faith which has been the outcome of all great discoveries since civilization began.

A. H. F.

During the year 1894, there was 1600 patents issued for electrical inventions.

Machinery is being put in the coal mines at Massillon, Ohio, for mining coal by electricity and it is claimed that within a few years that hand coal mining will be done away with.

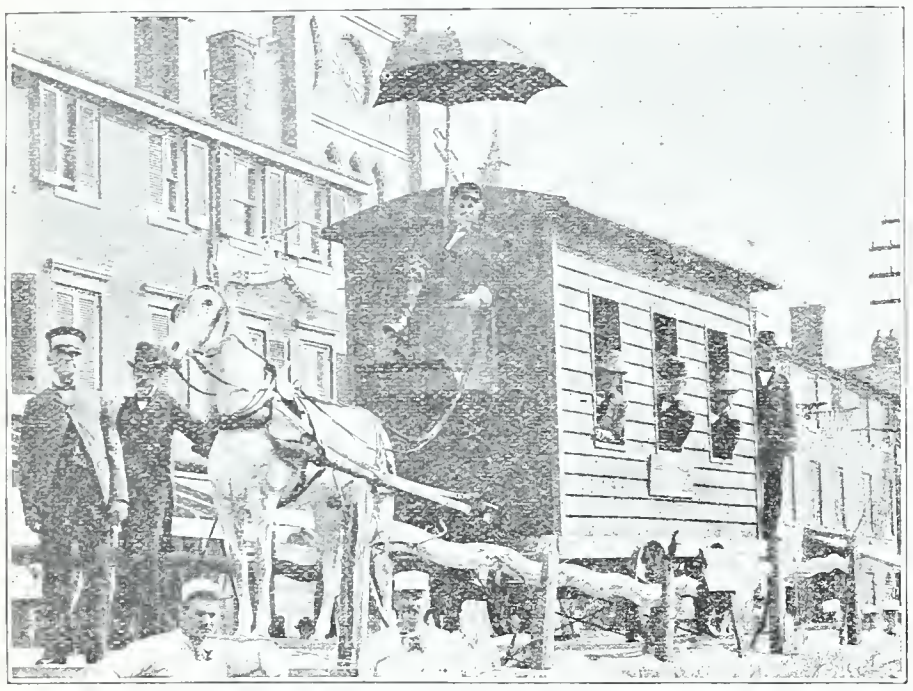
The Columbian Exposition Salvage Co., of Chicago, are seeking for some device for cutting up the thousands of tons of structural iron obtained by them from the World's Fair buildings. Here is an opportunity for some of the inventive reades of this magazine to exercise his talent that will produce material results.

Frederick E. Sickles, the famous inventor of apparatus for steering ships by steam and a member of the American Association of Inventors and Manufacturers, took luncheon at the Midland cafe in Kansas City on March 8th, went to his office, sat down in his arm chair and in thirty minutes he was dead. He was born on a farm near Camden, N. J., seventy-six years ago, and by an active life in the field of invention has won world-wide fame.

BALTIMORE & OHIO.

(*Continued from first page.*)

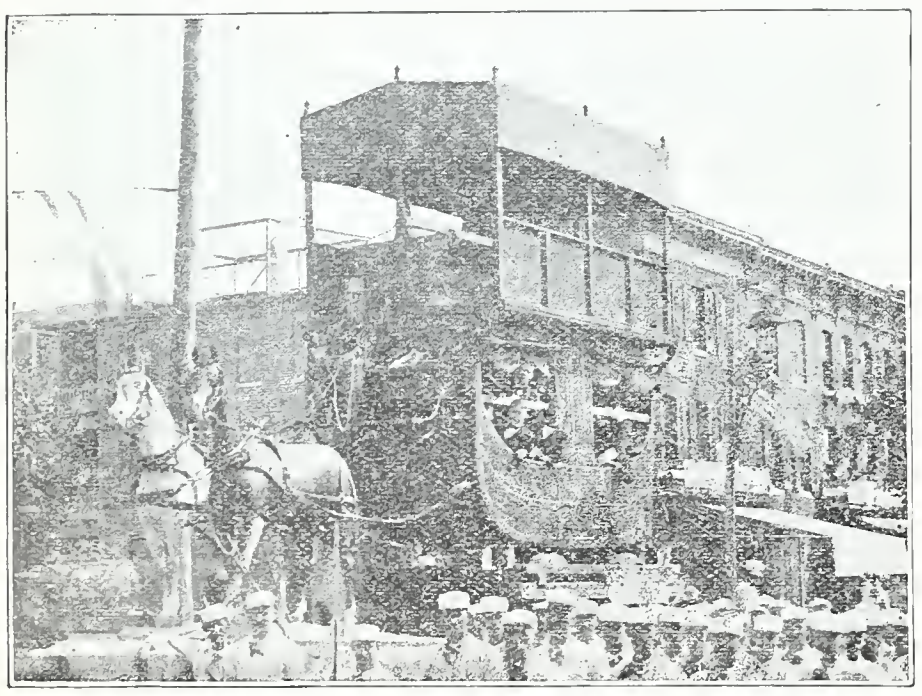
built to enable railroad trains to run under the heart of a populous city. The tunnel proper is one and one-half miles long, and including two cuts it is nearly two miles long. It is 22 feet high throughout its length, and 27 feet wide. At its mouth it is 55 feet wide, the largest tunnel opening in the world. It was begun in 1890, and more than 2,400 men were employed in its construction. The length



THE FIRST AMERICAN PASSENGER CAR.

of the Belt Road is seven miles including the tunnel, and cost of building was $7,000,000. The time saved is just fourteen minutes. The tunnel has just been opened, and when the road is opened for general traffic all trains will be drawn through it by great electric motors, being the first railroad to adopt electricity in place of steam.

To recapitulate the Baltimore & Ohio's alertness from the beginning in practically adopting every advance of railroad progress, perfecting its system through an intensely interesting evolution; expending $7,000,000 to earn fourteen minutes, thereby counting $500,000 not to great a price to pay for one minute; evincing in its management a keen faith



A "DOUBLE-DECKER."

in invention to the extent of always being the first in adopting the newest; it is thus no extravagance to believe almost anything great of this road in the futute.

From horse power to steam, from steam to electricity, interspersed with a foreshadowing faith in sails and magnetic attraction, this great railway may truly be said to be first in steam, first in electricity, the first in the American country. And because of this past present history of progressive policy, and in view of the manifold possibilities of advance science and invention, both in electricity and magnetic attraction, it is not impossible that the children of this generation may live to see this pioneer American road, mayhap, operating its traffic from great magnetic stations; since already it is demonstrated possible to draw great ships to shore from highly charged magnets; and what great invention in the future is too wonderful to be utilized by this remarkable road of indomitable progress? With a management whose personnel is unexceptionally brainy and masterful men of gigantic foresight and enterprise, it is always sure to be, as in the past and present, the great road of pioneer progress.

The event above referred to, for which electricians throughout this country are waiting with impatient interest—the operation of passenger and freight trains on the Belt Line tunnel of the Baltimore & Ohio railroad at Baltimore by locomotives in which the sole propulsive power will be electricity, is now nearing realization. Work has been progressing steadily lately at the works of the General Electric Company both upon the generating plant and the locomotives and the early part of this new year will propably see the huge locomotive handling the long trains with the ease for which they are designed. This experiment will be the first pratical step in this country toward the subjection of the steam trunk railroad to electricity. Two comparatively small locomotives, one of thirty tons and the other of forty tons on the drivers, are already running, but not upon any important lines, and while perfectly successful their operation gives but little clue to the outcome of the practical tests on the Baltimore & Ohio road. The delay that has occurred in the completion of the work has been of advantage in that it has allowed of the embodiment in this apparatus of all the recent improvements in electric railway practice.

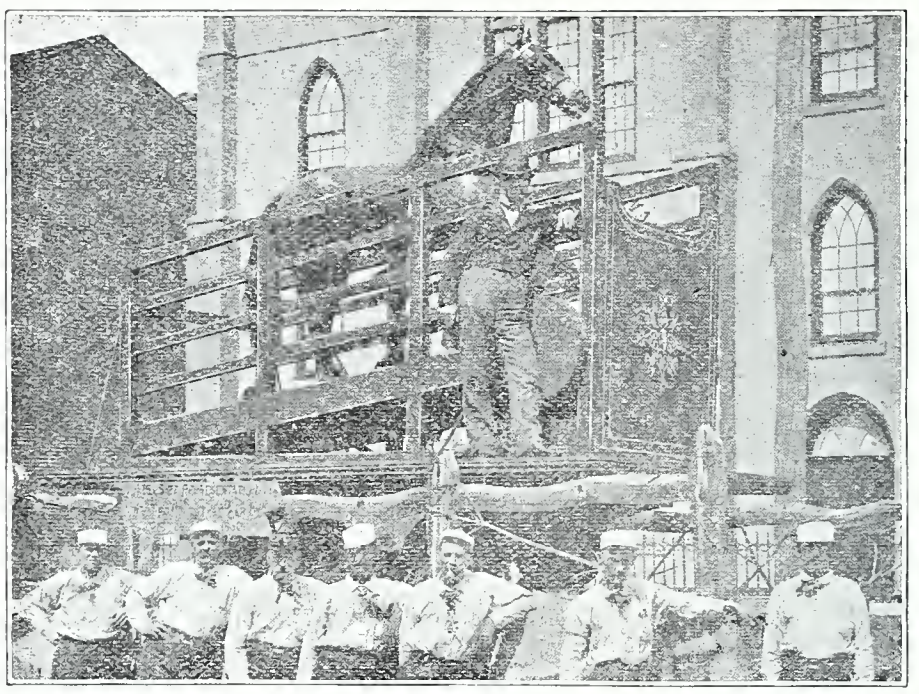
The trucks are of forged iron, each resting upon four driving wheels of cast steel, sixty-two inches in diameter. Flexibly supported on each of these trucks are two six-pole gearless motors one for each axle, transmitting their motion from the armatures to the wheels by means of an especially designed flexible coupling. The method of spring suspension has been carefully modified to allow of the immediate adjustment of the wheels to the irregularities of the tracks, and thus effect a diminution in the wear both in the motors and the track. The massive armatures are of the iron-clad type. A hollow shaft serves to carry the armature, through this passes the wheel axle, to which it is connected by the universal coupling already mentioned which allows of freedom of movement in any direction.

The complete motors are the largest railway motors in the world, and while ponderous in appearance, are by no means so bulky as might be expected from the heavy duty they will be called upon to perform. They are so set on the truck that they will be easy of access under all circumstances, whether the locomotive is at a stand still or in motion.

The cab, which will be spring supported on the truck frame, will be of sheet iron and wood and will have windows on all sides in order that the occupants may have an unobstructed view in all directions. Within the cab will be set up the series parallel controller by means of which the movements of the locomotive will be at the command of the driver, and the air pump, operated by a small electric motor, which will supply the air to the compressed air brakes and the whistle. The locomotive will be also equipped with bells, safety devices, etc., and will have a Janney automatic coupler at each end.

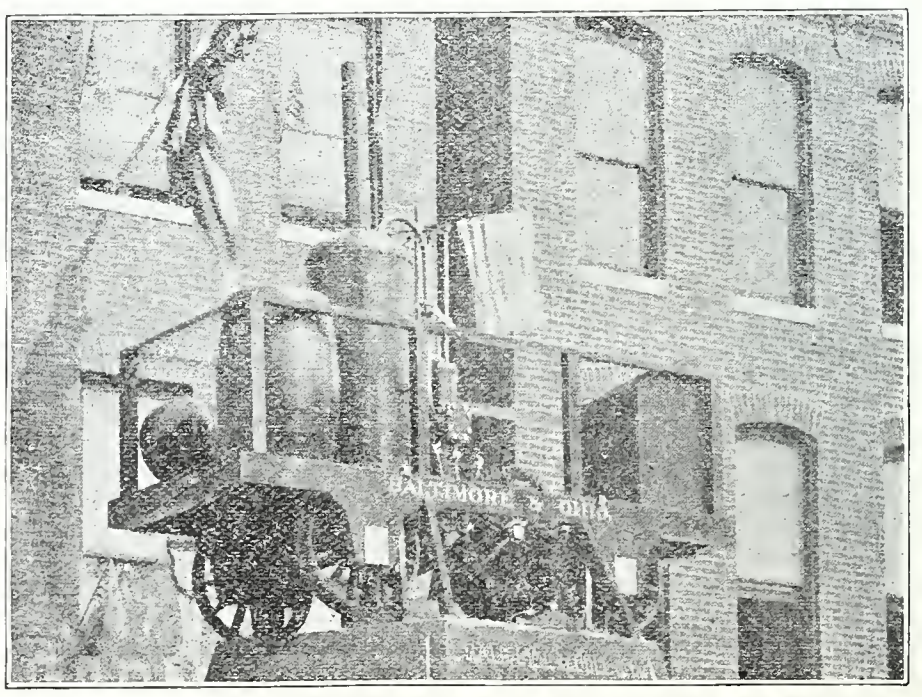
From the illustration of one of the trucks it will be seen that the finished locomotive will be an imposing piece of electrical machinery. It will weigh in its completed state ninety-five tons, will be 14 feet 3 inches long, 9 feet 6¾ inches wide, and will be of standard gauge. The maximum speed will be 50 miles an hour. This will be reduced to 30 miles an hour when only half the draw bar pull is exerted and to 15 miles an hour with full draw bar pull. The average speed of the loaded train will be about 30 miles an hour. It can of course be run either forward or backward.

This locomotive is designed for heavy work, and will be called upon to handle trains as heavy as those now handled by the heaviest steam locomotives. A test of one of the completed trucks as shown representing one half of the locomotive was recently made upon the tracks at the Schenectady



HORSE POWER OR TREAD CAR.

branch of the construction company. In order to obtain the necessary load a New York Central heavy six-wheel engine was made use of and the electric locomotive truck coupled to it. The machines were then sent in opposite directions and tugged at the connection coupling as in a tug of war. The electric locomotive had a slight advantage over the steam engine in weight on the driving wheels, and pulled it up and down the track with apparent ease. For the same weight on the drivers it was shown that the electric locomotive will start a greater load than the steam locomotive, the pull being constant throughout the entire revolution of the wheel, the difficulty of variation of pull with



PETER COOPER'S LOCOMOTIVE—THE FIRST BUILT IN AMERICA.

the angle crank as in the steam locomotive being eliminated. The test also proved that not only were the motors sufficiently powerful, but that the driving mechanism and armature couplings are amply strong to transmit the troque of the armature to the axle.

The power house is rapidly nearing completion

and the generating machinery is almost ready for installation. The overhead apparatus which has been especially designed to meet the extraordinary requirements will shortly be in position, and before many months have passed the steam locomotive will have become a neutral object in the operation of trains in the Belt Line tunnel, which, untarnished by smoke and soot, will be brilliantly lighted by incandescent lamps. A great step will have been made toward universal electrical locomotives on our steam roads, and the traveling public will have entered upon a new era.

FREIGHT CAR RUN BY WIND.

Do Patent Laws Retard Progress.

A professor in one of our best State Universities, in a recent book on political economy, states that the people in general have very little idea to what extent progress is retarded and manufacturing enterprise is interfered with by our patent system. He concludes that the remedy lies in knocking the props out from under the patent system by proper legislation. This seems to be a strage statement, coming as it does from so eminent an authority. Let us consider this matter a little.

It must be conceded that progress may in some cases be slightly retarded by a foundation patent in the hands of a poor or incompetent business man. But such cases are rare. By our patent laws the only reward to the inventor, or his assignee, lies in working and selling the patented invention. Hence it is not reasonable that an inventor should flatly refuse to work his invention or to allow others to do so on royalty, and thus deprive himself of his just reward. If a man does not work his patented invention, or give it out on a royalty, he probably will not interfere with other manufacturers. It would certainly be difficult to point out a case where an independent inventor has refused to work his invention for 17 years and has also refused to allow others to use it.

It is true that in some cases manufacturing concerns apply for or buy up patents for the sole purpose of keeping others from using the inventions patented and thus keeping down competition. But numerous cases could be cited showing that a company which has enterprise enough to pursue this course generally does more, by business energy and push to develop, perfect and promote its particular line of manufacture than a dozen weaker companies in open competition would do.

Of course the patent laws retard the progress of the infringer when he invades the rights of the patentee. So do the laws retard the progress of the rogue who would pasture his cattle upon the farm of another without permission, or who would break into a store at night to steal.

It may be true that when a fundamental invention is patented broadly, and when the patent is controlled by a strong company, other companies are discouraged from entering the same field of manufacture. In this sense progress may be retarded. The invention can not be worked by other companies for 17 years. In the mean time the patented article may be sold on the market at a high price. And it may be that there is very little inducement for independent inventors to try to improve on a line of manufacture when the foundation idea is thoroughly protected by a broad patent.

It must be remembered, however, that inventions do not grow on trees. They can not be raised in the garden like beets and cabbages. A few inventions are worked out in a short time and at small expense. But the majority of inventions, before they can be called a commercial success, require years of thought and worry and disappointment. Experiment must follow experiment, and failure must follow failure. Hundreds and often thousands of dollars must be expended. Plans must be changed, and nights of troubled sleep must be passed. The inventor must feel humiliated, dejected and disappointed. At last the article proves to be a success financially—in a few cases.

This is substantially the history of the majority of inventions. I know whereof I speak. Everything looks easy to the outsider. The artist seems to paint, the novelist to write, the orator to speak, and the carpenter to hammer, all without work or effort or trouble. The business of the man across the street seems to run without friction, almost like clockwork. It is only when one is on the inside that the trouble of any undertaking are apparent.

Hence it appears that without patent protection the fundamental idea itself would probably not have been developed, and subsequent improvements would not have been necessary or even possible.

It has been argued that manufacturers would make improvements and inventions anyhow, even if we had no patent laws, and that improvements not of a patentable nature are often made in order to secure advantages in trade.

In reply it need only be said that this argument is largely false. Some inventions would be made without the patent laws. Perhaps the printing press, steam engine and telephone would have been produced without patent protection. But whether this be true or not it is almost positively certain that we would not have the rapid automatic printing presses of today, or the swift locomotives, or the perfected telephones, without the encouragement of patent protection. There is little or no inducement for a mechanic or anyone else to spend time and money in working out and perfecting an invention which could not be claimed as property. As soon as the model is completed it can be duplicated by other men as cheaply as by the inventor himself. Would you plant and tend a vineyard if other people were allowed to eat the grapes without paying you?

If anyone would take the trouble to send a circular letter to every inventor whose name appears in the last issue of the Official Gazette and ask whether or not his invention would have been made and developed without the encouragement of the patent system, it is probable that ninety-nine out of a hundred would answer with an emphatic "No!"

And if one would write to the inventors of the country and ask whether or not they always come to the Patent Office with their best ideas, it is probable that ninety-nine out of a hundred would answer "Yes!"

Hence it is obvious that without the encouragement of the patent system not many inventions that are in use now would ever have been made or developed. Therefore it appears that the patent system encourages mechanical progress vastly more than it retards it.

It must be remembered also that only a few patents have broad claims. No one can claim more than he has actually invented. No one can claim what was known or used before his invention was made. The great majority of patents have limited claims. Other inventions may be made, and other patents way be taken out, in the same line of manufacture. In fact, when one form of construction is patented, manufacturers are often compelled to devise or invent other forms of construction in order to avoid infringement. In this way progress is encouraged rather than retarded. If the first form of construction had not been patented the manufacturers throughout the country could have adopted that form without devising and inventing new forms, which often prove to be better than the original inventions.

It may be observed here that new and valuable inventions do not often introduce themselves. Everyone who has had practical experience will understand this point. An invention may have genuine merit, but people do not run after it. Not only that, they will refuse to adopt it unless it has extraordinary merit or is urged upon them. People are suspicious of new devices. The reliability of a new article must be demonstrated by testing it in actual use before the people will accept it. Months and often years are spent in introducing a meritorious invention to the public. Would the inventor, then, take the time and expense necessary to put his invention on the market, if he could not be protected in his rights? I think not. He would not be wise to spend time and money to establish a trade which could be at once appropriated by others. He would be wiser in that case to manufacture an old and well-known article. Inventions, even of the highest order of merit, frequently have to be forced upon the market. The people are trained to use these new inventions, to their own benefit, somewhat as calves are trained to drink milk from a bucket. They are pleased with the invention as soon as they have learned to use it, but they would never have adopted it without some urging. Such is human nature. Men have been deceived in some cases, and they are often afraid to trust their own judgment.

I think it will be conceded by every thoughtful reader, and perhaps by the learned professor himself, after duly weighing the above argument, that the progress of the useful arts is fostered, encouraged and promoted vastly more than it is retarded by our patent system. EUGENE L. ARNOTT.

Greenfield, Ohio.

Books and Magazines.

The March issue of The Photographic Times is filled from cover to cover with interesting matter. It opens with an article on "Photography and the Detection of Crime," in which are detailed the methods employed in the detection of forgery, and in tracing the murderer and escaped criminal. Another article of absorbing interest treats upon "Spirit Photography," and is written by Mr. Meredith B. Little, the well-known spiritualist. It is illustrated with photographs said to be likenesses of persons who departed from this world thousands of years of ago. "Some experiments in electric photography," by Prof. F. Sandford, should also be read. It contains reproductions of photographs of coins made by electric discharges. Mr. R. D. Gray writes upon his three-color system of projecting photographs in their natural colors, the paper being illustrated with an engraving of the apparatus used. Many other articles of great value to the photographer are contained within the pages of this issue, together with a perfect gallery of over half a hundred beautiful photographs and illustrations. The photogravure frontispiece alone is a revelation in photography. The Photographic Times Publishing Association, 423 Broome Street, New York City.

* * *

The Hand Book of Practical Mechanics is compiled by Charles H. Saunders, Ph. B., of Yale, and published by the Student Publishing Co., of Hartford, Conn., is a valuable work along the many lines of mechanics. It gives in a simple and concise manner information regarding angles, areas, belting, bevel glass, blue prints and many new useful tables for practical mechanics.

* * *

"The Inventions, Researches and Writings of Nikola Tesla," by Thomas Commerford Martin, published by The Electrical Engneer, N. Y., has met with remarkable success. The first edition appeared during January, 1894, and the second was completely exhausted before the close of the year, several orders now being in hand for the third, which is expected early in January, 1895. It is rarely that technical books have such a reception. It has been favorably reviewed by the technical press of England, Germany, France, Russia, Italy and other countries; and an authorized German translation is now being brought out by the well known house of W. Knapp, of Halle. The book embraces all Mr. Tesla's inventions and researches made known up to date, and includes his oscillator, or new electrical generator, which he is rapidly bringing to a high pitch of efficiency and economy. The more important parts of the book have had the benefit of Mr. Tesla's personal revision.

* * *

"United States Income Tax Law, Simplified for Business Men," is the full title of an invaluable little handbook bound in neat covers and selling everywhere at 50 cents, being compiled and published by Mr. Ferdinand A. Wyman, a prominent member of the Suffolk County Bar, Boston, Mass. In this little volume of fifty pages the author gives a concise account of the Income Tax Law as it is in operation in several foreign countries; the full text of the new United States law which came into operation on January 1st, and also a very careful digest of the same. This digest is a remarkably simple yet full interpretation of the new law, shorn of all its intricacies and involved sentences, and by its aid anyone can, almost at a glance, understand just what has got to be done, and can make their returns to the government easily and accurately, and save much money in so doing.

IT is claimed that 500 pounds of sunflower stalks will produce about 300 pounds of paper.

THE United States has 31,000 miles more railroads than all of the remaining countries of the world combined, and Germany has the greatest mileage of European countries.

WAGES in the large shipbuilding yards of Ireland are less than one half the amount paid for the same work in this country. The pay for riveters is $7.54 per week; platers the same, and fitters from $6.75 to $8.

TODAY wood pulp is used by about 20,000 daily and weekly papers; cigar boxes and car wheels are made of paper; inventors are working on the problem of utilizing paper for a bullet-proof coating for war vessels. Undertakers are using wood pulp for cheap coffins; boats are manufactured from it; lead pencils, cigar holders, carpets, mattresses, artificial straws for drinking iced beverages, and many other useful and ornamental things are being constantly brought into use from the product of wood pulp.

Inventors and Manufacturers.

Continuation of biographical sketches of some of the members of the Association.

HENRY A. REED.

Henry A. Reed of New York, is a representative of that very useful class of inventors who are not patentees. It has been his life-long habit to improve everything his hand has touched, and has done much valuable work, especially in matters relating to the manufacture of submarine cables and other insulated electrical wires. He has for many years been at the head of the Bishop Gutta-Percha Company, of New York, which is the oldest establishment of its kind in this country.

HENRY A. REED.

In the early days of telegraphy, it was the custom to cross rivers with long spans of wire suspended from high masts, but this plan was very limited in its application, and the demand for sub-marine cables was met by Mr. Bishop, the founder of the company now under the supervision of Mr. Reed. In all the developments of the various electrical industries the company has kept pace with the varied demands for conductors of every description, and a large proportion of the wires and cables used by the telegraph, telephone, electric light and electric railways, have been made by Mr. Reed's company. The manufacture of these has called for the exercise of constant skill in devising new kinds of conductors, and especially of the necessary machinery. Many of the most ingenious and valuable devices and methods are the result of Mr. Reed's labors, and he is regarded as the leading expert in such matters. He is constantly consulted by various departments of the government in the work they have to do. He has planned and produced many of the cables used by the Light House Board, the Life Saving Service, the Army Signal Service, and Weather Bureau. Quite recently he devised a new cable, which is used in maintaining telephonic communication between the government light ships and the shore, a feat which had heretofore been regarded as impossible.

F. H. RICHARDS

In his earlier years Mr. Reed was associated with Professor Morse in many experiments on the telegraph lines extending northward and westward from New York City, and was largely engaged in testing the wires and locating faults and superintending repairs. He was one of the most expert testers and is known among telegraphers as a forty-niner, having commenced the business in that year. In 1852 he was first assistant of the New York office, in which all the Northern and Western business was transacted, and had an operating force of just three men. He received the news of the firing on Fort Sumter in the Poughkeepsie office, while Commodore Farragut, who was visiting friends in that city, stood beside him and read the message as Reed wrote it down, and the Commodore said to him: "That means I must go to Norfolk at once. I have many friends there, but if duty requires, I will blow the city to h—l."

W. BAMPFIELD.

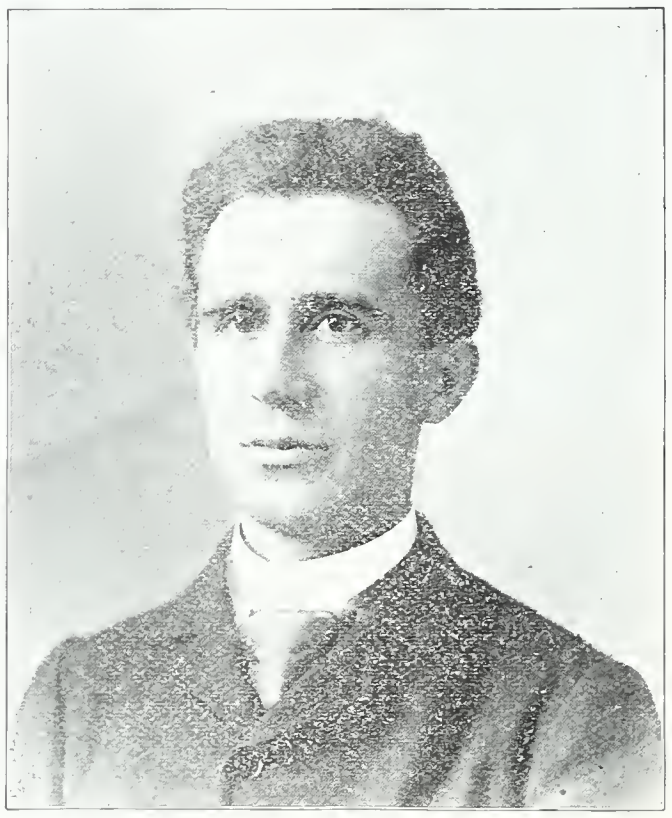
Mr. Reed is a native of Putnam County, N. Y., is about 66 years of age, and is a very active and energetic man of business.

FRANCIS H. RICHARDS.

In giving the biography of Francis H. Richards, it is almost unnecessary to state the fact that he is among the successful leading inventors of the country. Mr. Richards was born in Hartford, Conn., his present home, in 1850, his parents being among the first settlers of that city. At the early age of sixteen he began inventing and building machinery and has been actively engaged in the development of mechanical industries from that time to the present. The annual indexes of the Patent Office show during that time over three hundred patents have been issued to him, besides he has invented a great many valuable machines which he has given to the public, for which he never applied for a patent. Mr. Richards has been among the foremost in developing manufacturing enterprises based upon patents. During his connection with manufacturing, he has worked in all capacities, from apprentice to supervising-engineer and proprietor. In his business career, Mr. Richards ranks among the ablest of the day and is recognized as one of the most reliable mechanical engineers in this country. At present he is consulting engineer and adviser of several of the most prominent manufacturers in the United States. As a solicitor of patents and expert in patent cases, he has made it his successful aim to attain to the highest position. In his present life Mr. Richards is one of the most unassuming of men, but has a cordiality to those with whom he is associated that ranks him as a man of strong character.

W. BAMPFIELD.

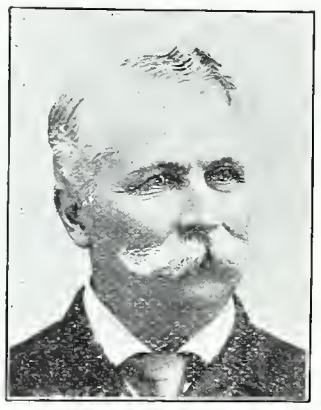
Mr. Bampfield was born December 17, 1854, on the Island of Cephalonia (Ionian Islands), and was educated principally in the Island of Jersey. He entered the English Army as sub-lieutenant, in 1872 and served in the Zulu war of 1879, returned from the English service in 1880 with the rank of a full lieutenant. He came to the United States in the spring of 1881 and entered into service of the Pennsylvania Telephone Company, at Reading, as its book keeper. He was successfully promoted to the position of cashier, was division superintendent and general manager. In February 1894, he became general manager of the Central District and Printing Telegraph Co., of Pittsburg, which position he now occupies. Mr. Bampfield in the different important positions occupied by him has shown that his early training in the English Army and the cool deliberation necessary as an officer during the critical positions that the Zulu campaign placed him, has demonstrated to the interests with which Mr. Bampfield has been connected, that he has been able to cope with the intricacies of business life in a manner that gives that confidence that is so necessaay to a successful issue of the important charges confided to his keeping.



EMIL BERLINER.

ASA S. BUSHNELL.

Although Asa S. Bushnell is sixty years of age, he is today one of the active and comparatively young men of Ohio, and stands out as a very strong political factor of the Republican party of that State as a compromise candidate for Governor. Mr. Bushnell was born in Rome, N. Y., of Connecticut parentage, receiving his education in Cincinnati, O. schools. In 1851, at the age of seventeen, he went to Springfield and took a position as clerk in one of the leading dry goods houses of that city. Four years more was spent as a book keeper, and in 1857 he embarked in the drug business, continuing in it ten years, when he became the junior partin the firm of Warder, Mitchell & Co., manufacturers of reapers and mowers. This firm began in a small way, and at first made its machines under a royalty from William N. Whitely, "the reaper king," of Springfield. The business was carefully managed, and prospered, and as Mitchell dropped out with a handsome fortune, Mr. Bushnell throve and grew. The death of B. H. Warder, the senior member, placed Mr. Bushnell at the head of the firm, from whose business he has already realized a handsome fortune.



A. S. BUSHNELL.

Mr. Bushnell has a war record that is highly creditable. He recruited a company of the One Hundred and Fifty-second O. V. I. toward the close of the war, and served as its captain. It is as a business man, however, that Mr. Bushnell ranks highest, and is most widely known. He has the confidence not only of his adopted city, but the close friendship of the leading men of Ohio, and it is safe to say that in him the State might well confide its executive trust.

EMILE BERLINER.

Emile Berliner is a young man who has achieved a reputation and decided prominence by his telephonic inventions. He is a native of Hanover, Germany, but has spent the greater part of his life in this country—up to 1877 he had been engaged in the dry goods business, but having had scientific inclination and being of an active turn of mind, he always spent his time in studying new things and in endeavoring to improve whatever his attention was called to. Professor Bell's invention of the telephone fascinated him and he immediately set to work to add something to it. While Prof. Hughes in England and Edison in the United States were making elaborate experiments, in the most thoroughly equipped laboratories, endeavoring to invent a powerful telephone transmitter, Berliner, in his own bedroom, with a few shillings worth of apparatus, was following the same track—and he reached the prize first. His invention has been the practical foundation of the telephone business for ten years. More recently he has been at work on the gramophone which is coming into extensive use. Unlike the phonograph this instrument is not designed for commercial purposes, but is used for private and public exhibitions.

PLINY JEWELL.

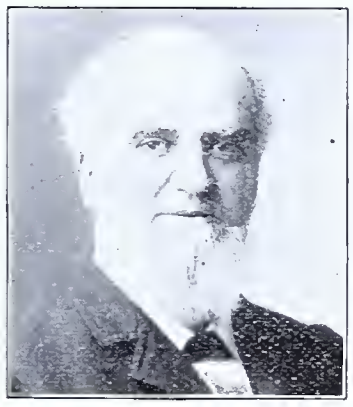
PLINY JEWELL.

One of the most progressive men in the New England States, as well as one of the most successful ones is Mr. Pliny Jewell of Hartford, Conn., brother of ex-Postmaster Gen. Jewell who for many years was a conspicuous figure in American politics. Mr. Pliny Jewell was born in Winchester, N. H. in 1823. For many years his father was one of the great tannery men of New England and in this business the young Pliny Jewell started his remarkably successful career. A little over forty years ago he joined his father and brother in the belt making business in Hartford, Conn., and through his energy and splendid business ability the firm became one of the best known belting companies in the world. He has held during his long and busy life many positions of high trust and responsibility. He is President of the Jewell Belting Co., the Jewell Belt Hook Co., and the Jewell Pad Co., and director in quite a number of banks, insurance companies and manufacturing corporations in and about Hartford.

F. HAPPERSBERGER.

FREDERICK HAPPERSBERGER.

Fred'k. Happersberger is the proprietor of the Crescent Tool Works, Toledo, Ohio, manufacturers of watchmakers' and jewelers' tools, also maker of the electric annunciators which require no returning to position, alternating current watch demagnetizers etc. Among the specialties made under his patents are watchmakers' counterbores and electric annunciators. He recived a common school education after which he learned the trade as a watch maker, confident that the demands of the watch repairer were for a high standard of bench tools he started the manufacture of a variety of small bench too's. Since prior to a few years ago nearly all such tools were imported. Mr. Happersberger is a naturalized citizen, he was born in Gruenstadt, Rhine Palatine, Germany, Sept. 5th, 1857, and came to this country in 1881. After receiving a public school education he was apprenticed as a watchmaker at the age of 14 in his father's work shop, in 1878. In order to gain more practical experience he entered the employ of Carl T. Wagner of Wiesbaden, a celebrated watchmaker and manufacturer of electrical apparatus. In 1889, he went to Toledo and was for some time in the employ of M. Judd. Jeweller. He has been a remarkably successful man of great enterprise and public spirit.



LEWIS MILLER.

LEWIS MILLER.

Lewis Miller, manufacturer, was born in Greentown, Stark county, Ohio, August 24, 1829. He is the son of John Miller, a cabinet maker, house builder and farmer, who moved from Maryland to Ohio in 1812. Lewis grew to young manhood on the farm, attended country school in the winter time and at 17 was a teacher in charge of the school. In 1846 he learned the plastering trade, which he followed for five years, teaching two terms in Stark county, attending an academy in Illinois and locating in Plainfield, near Chicago.

AUGUSTUS DAY.

In 1851 he returned to Greentown and entered the employment of Ball, Aultman & Co., manufacturers of plows. In the fall of that year the firm moved to Canton. Here they manufactured plows, stoves, threshing machines and reapers of the Obed Hussey pattern and did general machine work. Mr. Miller was an apt mechanic and soon rose to be superintendent of the works. While in that position he invented the Buckeye mower and reaper, characterized by two wheels, both drivers, and the double-hinged floating bar, a distinctive feature after which all two-wheeled, floating-bar machines have been patterned. Since then he has taken out letters patent for about a hundred inventions.

In 1863 a new firm was organized under the name of Aultman, Miller & Co., a factory was established in Akron, and in 1864 Mr. Miller moved to Akron, which has since been his home. He is general manager of the company.

J. H. WOODWARD.

The new Buckeye machine proved a great success, and being continually improved by its inventor it attained great celebrity and an extended sale reaching into all the civilized countries of the globe. Of those inventors who gave shape to harvesting machines now universally employed Mr. Miller was one of the most prominent, and he is the only surviving representative.

Having led a busy life his interests were widely extended, and he was president of many important corporations and director of many more. Owing to the financial reverses which have embarrassed some of his companies and to advanced years, he has of late restricted his business connections. He now gives little attention to affairs outside of his Buckeye harvester interests. The Buckeye being the child of his own brain, he looks after its welfare with all the zeal and solicitude of a father.

Mr. Miller joined the Methodist Church in 1843 and has since been one of the most generous and progressive members of that church, being deeply interested in its work. He was an active spirit in originating the annual assembly at Chautauqua, N. Y. In fact he was the founder of that movement, and has been President of the Board of Trustees since the first. He is also President of the International Sunday School Union at the present time.

Mr. Miller was married September 16, 1853, to Miss Mary V. Alexander, of Plainfield, Ills., and ten of his children are yet living. One daughter, Mina, is the wife of Thomas A. Edison, the inventor.

AUGUSTUS DAY.

Augustus Day, of Detroit, Mich., at the head of the large manufactory for street railway track cleaners in that city, was born in Planeville, Conn., in 1821, his ancestors arriving in Massachusetts in 1634. His father, Robert Day, was among the first settlers of Hartford, Conn., and his name, with 100 others, is enrolled on the historical brown stone monument which was erected in honor of the hardy pioneers of those early days in the ancient cemetery of that city. Mr. Day's life has been an eventful one. He sailed on the great lakes for eleven years, occupying the position of cabin boy to master and builder. In 1847 he commenced his inventive career and since 1860 has made a specialty of street railway track cleaners and snow plows. In 1869 his track cleaner was put in successful operation on the street car system of Detroit, and at this time, there are over 500 railway systems throughout the United States using them. Mr. Day's snow plows are also successfully used by several of the leading railroad corporations. Since March 12, 1859, when Mr. Day first went to Detroit, he has made it his study, while advancing his own interests, to give his best efforts to the city of his adoption.

E. B. HERZOG.

J. H. WOODWARD, M. D.

This gentleman is a resident of Seward, Nebraska, and is one of the proprietors of the Electric Medical Institute located in that city. Dr. Woodward has been in the active practice of medicine for the last twenty-five years, and since twelve years ago has devoted his attention to electrical science.

He has invented some very important useful electro-therapeutical instruments, among them an electric fountain syringe, an electric hypodermic syringe and an electric inductive cabinet, all of which are practical inventions and been received with much favor. He is also an author of a work on electro-therapeutics. He has been elected Emeritus Professor of Electro-Therapeutics in the Medical Department of Nebraska State University, and a member of the National Society of Electro-Therapeutics.

PROF. F. BENEDICT HERZOG.

The subject of this sketch is an electrical engineer of great prominence and an inventor of useful contrivances in the domain of electricity.

He was born in New York City in 1859, and received his degree of Ph. D., A. M. and L. L. B. from Columbia College. He took out his first patent in 1883. Two years later he organized the Herzog Teleseme Co., and is still its president. This instrument, which has been received with great favor, is an electric recording apparatus. The doctor has served two terms on the council of the American Institute of Electrical Engineers.

As an expert in matters pertaining to electric signalling he is recognized by electrical scientists, and his work in this direction has entitled him to high praise.

EUGENE L. ARNOTT.

Eugene L. Arnott was born on a farm near Greenfield, O., where he spent his early life as a farmer boy and attending the county schools. Owing to his delicate constitution he was compelled to leave his studies in the school soon and for some time by his perseverance and pluck, kept up with his class by study at home. By active out-door life Mr. Arnott succeeded in building up his constitution strong enough to permit him to again take up his education in the South Salem Academy, but his eyes soon failing him, he was again obliged to cease his educational pursuits. Under skillful treatment his eyes were restored sufficiently to permit his entering the academy, from which he soon graduated and after spending two years in the University at Wooster, he was again obliged to retire on account of his health. As soon as he was able he commenced a course of study of practical engineering at Springfield, O., and finally gave his full attention to patent law in which he has been engaged for some years past. Mr. Arnott has taken out several patents, some of which have proved valuable. For a number of years Mr. Arnott has been a contributor for some of the scientific magazines and several of the large dailies of Cincinnati. His literary efforts have been along the lines of mechanics and patent law, and many of his articles have been of practical value to the inventors of this country.

E. L. ARNOTT.

A. F. ANDREWS.

A. F. Andrews, of Avon, Connecticut, inventor and manufacturer of Safety Fuse on the endless length plan which is now being used in all parts of the world, was born at Avon in 1824. He was raised on a farm and received an academic education at Westfield, Mass., after which time Mr. Andrews spent four years in travelling and lecturing on Phrenology and Physiology. When he was twenty-seven he commenced his inventive career by the invention of his Safety Fuse and since that time has made other valuable inventions.

A. F. ANDREWS.

Mr. Andrews has never been what is considered a conservative man. On the other hand he has been a radical on all of the leading reforms, and is a strong, aggressive champion in all matters pertaining to humanity and its improvement, always being found in the front ranks of progression.

H. D. BENNETT.

Mr. H. D. Bennett of Columbus, Ohio, President of the Pneumatic Watchman's Check Co., also Vice-President of the National Time Register Co., is one of the coming young men of the day. Mr. Bennett was born in Toledo, O. in 1867; his parents moved to Indianapolis, Ind., when he was two years of age where he lived until he was nineteen, when he went to Columbus, O., and soon entered into the Time Recording business. His sterling qualities and energies were soon recognized and he began thus early in life to take a prominent position in the business world. Mr. Bennett is the inventor of the National Time Register and improvements of the Watchman's Check, and organized the company for the manufacture of the goods, which company he was elected president and by his indomitable and thorough business push has made the company one of the leading industries of the State.

H. D. BENNET.

It is to such young men that the country must look for future development, and in giving this brief outline of Mr. Bennett's career, it is a pleasure to note that his inventive talent is recognized by the leading newspapers of the United States by their using his system of Pneumatic Watchman's Check.

SCIENCE FOR YOUNG PEOPLE.

Conducted by E. P. LEWIS.

If a tuning fork is set in vibration, as its prongs move outward they compress the adjoining layers of air, and these the next layers, and so on until the prongs begin to return to their original position, when the pressure is relieved, and the air is allowed to expand again. In this way waves of alternate compression and rarefaction are sent out into the surrounding space, the length of each wave being the distance travelled by the disturbance during an entire vibration of the fork. If these waves reach our ears, they produce the sensation of sound, and if they do so at regular intervals we say that they produce a musical tone; if irregular, we call the effect a noise. The pitch of a sound depends upon the number of waves reaching our ears every second, while the loudness depends upon the strength of the impulse producing it. We can only perceive a musical tone between certain limits of pitch which differ with different people. If less than 16 waves per second are sent out by a sounding body, we hear only the detached sounds of each, not the blending together which constitutes a tone. Sounds exceeding 40,000 vibrations per second are inaudible. since the ear cannot respond to such rapid impulses. Some persons cannot detect sounds having a pitch of only 12,000.

Experiment has shown that all sounds travel with the same velocity. If this were not the case. the music of a band would become discordant at a distance, as waves of one pitch would lag behind those of another. During every second a sounding body sends out a train of waves where combined length is equal to the velocity of sound, since the velocity is defined as the distance through which the sound disturbance passes in one second; consequently the length of each wave multiplied by the number of waves sent out in a second must equal the velocity, and since this is the same for all sounds, the length and frequency of all sound waves are inversely proportioned to each other.

* * *

Sound will not travel in a vacuum, but only in a material substance, and its velocity depends upon the density and elasticity of the substance. It travels faster in warm than in cold air, because the elasticity of air increases with its temperature. At ordinary temperatures it travels about 1,100 feet per second in air, and about four times as fast in hydrogen. In water its speed is about 5,000 feet per second, and in iron 17,000 feet. If one ear is held to an ear trumpet, the other end of which is under water, the explosion of a distant blast under the water will be heard twice, first through the water, and then through the air.

* * *

If a vibrating tuning fork be held over a tall cylindrical glass vessel into which water is slowly poured, when the water reaches a certain point it will be observed that the sound of the fork is greatly increased, while if more water is poured in it will decrease in loudness. This is due to the two facts that sound waves can be reflected like those of light, and that two waves of condensation, or two of rarefaction will add their effects, while a wave of condensation will neutralize a wave of rarefaction when they meet. As usually expressed, when two waves meet in the same "phase" their effect is increased; when in opposite phases, their effect is diminished. In the experiment just described it is easily shown that when the distance from the fork to the surface of the water is just one-quarter the wave length of the sound sent out by the fork the reflected waves will meet these coming direct from the fork in the same phase and will reenforce the sound. By measuring this distance we can, if the pitch of the fork is known, calculate the velocity of sound. The same effect is produced by the sounding boards of musical instruments, which vibrate in unison with the strings and strengthen their sound.

* * *

A very beautiful experiment was devised by the German physicist Kundt to show the difference of the velocity of sound in air and in a solid such as glass. The experiment may easily be repeated by any one, Get two glass tubes, one about 3 feet long and one inch in diameter, the other 4 feet long and

KUNDT'S TUBE.

one-quarter inch in diameter. On one end of the small rod fix a cork that will just fit easily in the large tube, and slip exactly over its center another cork that will fit lightly in the large tube. In the latter sprinkle some light substance such as cork filings, insert the small tube, pushing its middle cork in tightly, and close the other end of the large tube by a cork which may be pushed in or out. Now stroke the free end of the small rod from its center outward with a wet or resined rag until it gives out a distinct musical note of high pitch, and observe what happens to the cork filings. They may be set in vibration and settle down in a number of little heaps at equal distance apart. If they do not move the other cork in or out until this effect is produced, stroking the rod all the time. The rubbing of the rod sets up vibrations in it such that the length of the rod is one-half of their wave length. The cork at the end, acting as a piston, imparts these vibrations to the air, and when the distance between this cork and the one closing the other end of the tube is any exact multiple of a wave length of the sound of this pitch in air the waves reflected from one end will meet those coming from the other in such a way that "stationary" waves will be produced. That is, at intervals of every half wave length the two sets of waves will always meet in opposite phases and neutralize each other, so that at these points, called nodes, there is no disturbance. The little piece of cork after being disturbed by the vibrations will settle down at these points in little heaps. so that by measuring the distance between them we can get the wave length of sound of that pitch in air, and this length compared with that of the vibrating glass rod gives us the relative velocities of the sound in air and in glass. By filling the tube with hydrogen and other gases we may thus determine the velocity of sound in them.

* * *

The interference of sound waves by which the combined effect of two sounds may be silence, can be simply shown by an ordinary tuning fork. Setting it in vibration and turning it slowly around near the ear, you will find four positions in which its sound becomes very feeble. This is due to the fact that there are four lines along which waves of rarefaction or condensation from between the prongs meet waves of opposite phase from outside the prongs, thus partly neutralizing one another. The "beats" produced by two forks not quite in unison are due to the fact that at regular intervals, as one gains on the other, the two sets of waves may be alternately in the same and in the opposite phases.

* * *

One is apt to think that Edison's phonograph, which will accurately preserve and reproduce any sound, must be a very complicated instrument, but as a matter of fact it is exceedingly simple, as may be seen from the accompanying diagram. A is a screw which carries a cylinder C made of a compo-

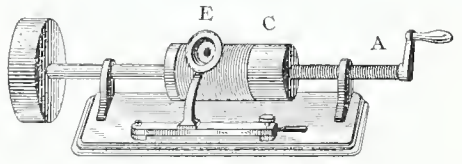


Fig. 1.—EDISON'S PHONOGRAPH.

sition of hard wax, which moves slowly from one end of the screw to the other as the latter is turned. E is a fixed mouth piece closed by an elastic metal disc carrying a sharp steel point which just touches the wax. When the mouth piece is spoken into the disc is set in vibration, and if the cylinder is at the same time turned the point will dig a little spiral groove in the wax, the varying depth of which registers the vibrations of the disc. To reproduce the

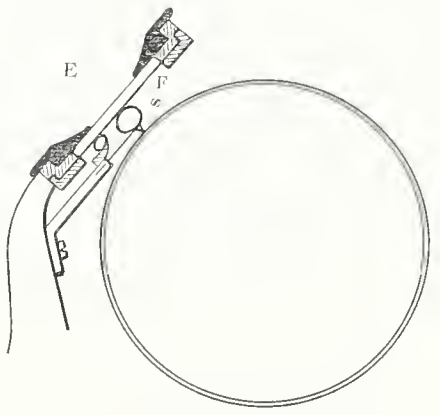


Fig. 2.—PHONOGRAPH REPEATER.

sound, a repeater is used similar in construction to the recording mouth piece, as shown in the next figure. A point S travels in the groove, rising and falling as it passes the projections and indentations in the groove and transmitting these motions to the elastic disc E through a piece of rubber F. In this way the disc is caused to move in exactly the same way as did the recording disc, and will of course reproduce the sounds that caused the latter to move. In this way as many as 40,000 words may be registered in a space of 10 square inches. The graphophone of Tainter and Bell is constructed on a similar principle.

Rights of Inventors Not Denied by Supreme Court.

EDITOR INVENTIVE AGE:

The recent publication in The World's Progress on the above subject, is so likely to convey an erroneous idea, that I desire room for correction.

In the case referred to, Schillinger et al vs. the U. S., decided Nov. 19, 1894.-69. O. G. 1505—the Supreme Court while deciding adversely to the plaintiff below, did not hold that the U. S. could use a patentee's invention without remuneration, but exactly the reverse.

In that case the court held that the action was for a tort, and that the U. S. could not be sued for a tort.

It further held that the Court of Claims had no jurisdiction of the case, because there was no contract expressed or implied, and because also the case had not been referred to the court by either House of Congress, these being the only cases in which the law gives the Court of Claims jurisdiction. For those reasons alone the decision below was overruled.

In regard to the right of the inventor or owner of a patent to recover for the infringement of his patent, the court said his remedy was by a suit under Sec. 4919 of the R. S., (the patent law.) but that this was not a suit for infringement, but for a test.

The court cites the decision in the case of the U. S. vs. Palmer, which was a suit for compensation for the use of a patent, and in which the Supreme Court affirmed the judgment of the Court of Claims in favor of the patentee.

I was the "expert" in this case and know all about it, aside from the decision.

Formerly it had been held that the Court of Claims had no jurisdiction in patent causes, but it was held that it had in all cases based upon a contract express or implied, and since then there has been no question on that point, and I know personally of numerour suits since of that kind. Several such are now pending in that court.

But aside from that the Supreme Court in Seymour vs. Ogden, 11 Wallace 552, and in numerous other cases, decided that inventions secured by letters patent, are property in the holder of the patent, and as such are as much entitled to protection as any other property consisting of a franchise, during the term for which the franchise or exclusive right is granted.

Then the Constitution provides. "Nor shall private property be taken for public use without just compensation."

In the case of U. S. vs. Burns, ante the Supreme Court discusses this very point, and cites the case of James vs. Campbell, 104 U. S. 356, in which that court used this language:

"That the Government of the U. S. when it grants letters patent for a new invention or discovery in the arts, confers upon the patentee the exclusive property in the patented invention which cannot be appropriated or used by the Government itself, without just compensation, any more than it can appropriate or use without compensation land which has been patented to a private purchaser, we have no doubt.

There have been many suits against the officers of the government for using patented inventions, in which the courts have rendered judgments in favor of the owner of the patent. A prominent case was where Col. Benton of the Springfield Armory, was sued for infringing a patent taken out by my firm in which a judgment was rendered for $70,000 which the Government paid. Another in which Miller Brothers recovered $12,000 for infringing a patent of theirs, also used in manufacturing the Springfield rifle.

In the words of the Senate Committee on patents in its report in 1876:

"There is, and there ought to be, no honorable or honest "ways or means" that this Government can devise, whereby to withhold payment for the use of property secured for a term of years by grant of letters patent, and appropriated to that service by that Government. It ought to pay a fair and just compensation for that use. This would be but an act of justice and of honest dealing with the citizen inventor, and it would stimulate him to greater activity in the field of invention."

The trouble is not in the courts, so much as in Congress; for, as was truly said in a report by Mr. Springer, when chairman of the Committee on Claims, a few years ago. "It is a virtual denial of justice for a citizen to present a claim to Congress," simply because, even when reported favorably by the committee, the House seldom if ever acts upon it.

My own case, refrred to in the article in the World's Progress, is an illustration—my case having five times passed the Senate, and been five times favorably reported in the House, but never voted on there.

W. C. DODGE.

Washington, D. C., February, 1895.

NEW PATENTS FOR SALE.

Advertisements inserted in this column for 20 cents a line (about 7 words) each insertion. Every new subscriber sending $1.00 to THE INVENTIVE AGE will be entitled to the AGE one year and to five lines three times FREE. Additional lines or insertions at regular rates.

FOR SALE.—A valuable patent, No. 506,545. A Combined Sewing Stand and Ironing Board, a very useful piece of furniture. A chance for agents and manufacturers to make good interest on their money. Address, Mrs. Martha Reck, Union Bridge, Md. 3-3

FOR SALE.—I will sell outright, or on royalty, my valuable patent, No. 527,568, Burial Case or Vault for Graves. Manufactured from fire clay or other suitable material. Address, Jas. F. Hobson, New Antioch, Ohio. 3-3

FOR SALE.—Patent No. 511,048, Work Bench for Saloons, outright, or on royalty. Something new. A chance for manufacturers or capitalists to make good interest on their money. Print and specification to intending purchasers. Charles E. Groves, Seneca Co., Attica, O. 1-3

FOR SALE.—I will sell outright, or on royalty, my valuable patent Pipe Wrench in Canada and England. It is superior to any in use and can be cheaply constructed. Address, James A. Smith, Cleavesville, Mo. 3-3

FOR SALE.—My patent, No. 513,542, and also an additional patent allowed but not issued, "An improvement in Tinners Hand Shears or Snips." Will sell on reasonable terms. Address, Geo. H. Stockman, 3510 N. 17th street, Philadelphia, Pa. 3-4

FOR SALE.—Patents No. 420,639 and 420,640; Railway Track Cleaners for street railways, and one for use on a locomotive to clean what the pilot passes over. Reason for selling is my age and desire to retire from business; have made track cleaners for past 22 years and will sell present business which is well established. No speculators need apply, but men wanting a good business. Address, Augustus Day, 73 State St., Detroit, Mich. 1-3

FOR SALE.—My patent Ratchet, the best time saving device ever invented. Will sell at a reasonable figure. For particulars address, O. Smith, 415 York ave., Philadelphia, Pa. 2-3

FOR SALE.—Patent No. 525,225; Gravity Door Lock. Has no springs, Easy working, cheapest and most durable. Address, B. S. Miles, Gray Summit, Mo. 2-6

FOR SALE.—Patent No. 531,533; Dinner Pail. Containing Lantern, Food, Drink and Hand Warmer, with boiling cup attachment. Will sell on royalty. Address, Henry M. Holmes, Ayer, Mass. 2-3

FOR SALE.—Right to manufacture Patent 518,642; Breen's Car-wheel Fenders. A safety device for any kind of car—either electric, cable or horse car. S. A. Breen, Alexandria, Va. 2-2

FOR SALE.—A, valuable patent, No. 506,910; Attachment for Vehicles; big money in it. Gold Medal Awarded on the Machine, October, 1894, at the Mt. Holly Fair. Send three 2-cent stamps for photograph. Address. J. E. Haines, Medford, N. H. 2-3

FOR SALE.—County and State rights, Johnston's Storm Sash and Outside Shutter Fastener. Address, J. D. Johnston, Newport, R. I. 1-4

FOR SALE.—State rights on process of casting and tempering pure copper, simple and cheap as brass founding; solid and tough castings guaranteed; unsurpassed for electric purposes. Name location wanted. T. D. Bottome, Indianapolis, Ind. 2-3

FOR SALE.—New Improved Sash Balance, patented July 4th, 1893; No. of patent 500,967. Will sell or manufacture on royalty plan. For further information, address the inventor, Joseph H. Shipman, Whippany, Morris Co., N. J. 1-3

FOR SALE.—I would like to sell my patent No. 472,855, for automatically draining the condensation from slide valve engines and pumps without loss of steam. Just the thing for locomotives and traction engines. For further information, address, R. P. Capwell, Linden, Genesee Co., N. Y. 1-3

FOR SALE.—My patent No. 505,333 in U. S., and 45,619 in Canada, on Road Cart. Guaranteed to be a good rider, good looker and free from horse motion. Send for cut of cart. Jacob S. Shoemaker, New Lothrop, Mich. 1-3

FOR SALE.—Patent No. 454,254, on toy belonging to the "puzzle" family. A fine opportunity for some person or novelty manufacturer. Only $190 and royalty if taken at once. Max Cohn, 828 Vliet St., Milwaukee, Wis.

FOR SALE.—Two recent valuable patents for Illuminated Revolving Day and Night Store Window Advertising Apparatus practical for introducing and pushing any kind of business, especially in the way of novelties. Owing to pressure of other business patentee will dispose of both patents at a very small price. Address, the sole owner and patentee, S. Kuh, Sioux Falls, South Dakota.

FOR SALE.—Patent No. 499,996; Recepticle for Growing Plants; simple, cheap, durable and ornamental. Especially adapted to big plants which can be transplanted or transported without trouble. Here is something of value. Patents in United States, England and Germany. Write to me for particulars. Carl Hoffman, 818 Mill St., Roseburg, Oregon. 1-3

FOR SALE.—Patent No. 524,279; Rocking Chair. Enables occupant, through easy push on the rocking foot or arm rest, to swing and rock combined; adjustable parts. State and county rights for sale. Address, John Koltmann, Jeannette, Pa, 2-5

FOR SALE.—Outright, or State right, my two U. S. patents, Nos. 445,929 and 503,564, for "Shaft Tugs." If I can sell or lease whole business, will let the tooles for making the goods go with patent. Address, E. L. Carlton, Selma, Clark Co., Ohio. 3-3

FOR SALE.—Patent No. 436,183, Glass Plant Protector; frost proof; produces melon and all other vegetables twenty days earlier than in the open air. Will sell out right or on royalty. Testimonials on application. Address, John Holder, Morley, Scott Co., Mo. 3-3

FOR SALE.—A valuable invention; Patent Seed and Grain Cleaner. Will sell the territory of several of the eastern states. Address, Jos. W. Henry, 504 American Bank Bldg., Kansas City, Mo. 3-3

FOR SALE.—A valuable patent, No. 523,962. Patented July 31, 1894. Has been thoroughly tested with good results. "Supporting Attachment for Bicycles." For price and particulars address Henry W. Woodward, Box 422, Chicopee, Mass. 3-1

FOR SALE.—A Patent Furniture Castor to prevent insects of all kinds from infesting furniture. It is one of the best things on the market. Does not infringe another patent. Address, Jonathan Elwood, Sanger, Cal. 3-2

BUSINESS SPECIALS.

Advertisements under this heading 20 cents a line each insertion—seven words to the line. Parties desiring to purchase valuable patents or wanting to manufacture patented articles will find this a valuable advertising medium.

WANTED.—Resident buyer wishes the control of a line of goods from reliable manufacturers for this market, Philadelphia and New York. Good selling articles—moderate prices for prompt cash. Address, S. A. Patterson, 2239 N. 16th street, Philadelphia, Pa. 3-1

WANTED.—An agency to purchase or promote the interests of a good and meritorious invention. Address, with descriptive particulars, H. S. Hampton, Box 223, Lima, O. 3-3

WANTED.—Small articles to manufacture on royalty; must be meritorious and in popular demand. Give full particulars of patent with stamp for reply. G. W. McCoole, 720½ Pine St., St. Louis, Mo. 1-3

WANTED.—An experienced salesman to sell my new patent. A preventative against train or bank robbery. For particulars, address, Silas E. White, Watertown, N. Y. 2-3

WANTED.—I want $50 for one year to pay remaining fees on a valuable patent just allowed. I will give for this one-tenth of the proceeds from the invention and also return the money with interest. I have a good working model. It is inexpensive to build and worth ten times its cost. Business confidential. Address, E. W. Barton, Windsor, N. Y. 1-3

WANTED.—Manufacturers or capitalist who wish to pay all expenses for an interest in the patent for a meritorious invention to be patented. Address, George C. Stanton, New Iberia, La. Correspondence solicited.

WANTED.—Wanted to correspond with parties who have valuable patents which they desire to dispose of. Address, Box 287, Dolgeville, N. Y. 3-1

ARE YOU a wide-a-wake manufacturer looking for new and practical patents in your line? If so, address at once G. Laube, Inventor and Patent Salesman, Huron, South Dakota. 2-3

"Tips to Inventors."

This is one of the most instructive and useful works for mechanics and inventors. Its author is Robert Grimshaw, M. E., and the book, cloth bound, retails for $1. THE INVENTIVE AGE for one year and "Tips to Inventors" will be sent to any address for $1.50

An Extraordinary Offer.

THE INVENTIVE AGE has made arrangements whereby it can furnish the complete set of World's Fair views—220 in all—at a nominal figure. These views are not cheap wood cuts but fine half-tone cuts covering every important feature of the greatest of the world's expositions. THE INVENTIVE AGE one year, and this set of views will be sent to any address, postage paid for $1.35.

Still another great offer is that of the People's Atlas of the world—maps and statistics corrected up to 1884—124 pages—maps of every state and every nation—a complete Atlas, with over 300 illustrations, usual price $3 to $5. We will furnish THE INVENTIVE AGE one year and send the Atlas to any address, postage paid for 1.35. Reliable agents wanted in every county in the United States. Send for terms to

THE INVENTIVE AGE,
Washington, D. C.

Aftermath.

During the year 1894 there was 399 engineers and firemen killed and injured by railroad accidents.

—

The Ensign Car Works, Huntington, W. Va., idle for months, will resume say in March, having orders for 750 cars.

—

The Elgin National Watch Company and the Waltham Watch Company are to be consolidated and pass into the possession of a British syndicate. The valuation of the two properties is $16,000,000.

—

An innovation in the shape of an air brake instruction car has been introduced into service on the Pittsburg & Lake Erie road. The car is fitted up with the usual apparatus and the instruction given is greatly improving the service.

—

The question to what extent the pneumatic tire, so familiar on bicycles, will be adopted on the wheels of other vehicles is one of considerable interest. According to a London scientific journal for cabs and broughams in English cities the rubber tire, with an iron hoop outside, is steadily growing in favor, and thousand of them are seen.

—

Professor George Forbes says of the Niagara Falls power transmission scheme: "It is difficult for me to say who are the bolder, the capitalists who are embarking into the scheme or the manufacturers who are moving their factories before a single result have been achieved. The action of both are typical American, and their confidence was not misplaced, as the success of the scheme is now assured."

—

The Leeman-Baumgartner system of heating by air and oil combined, the invention of Johannes Leeman, 43 Leonhard street, St. Gall, Switzerland, may be briefly explained as follows: By means of an air pump, compressed air is forced into mixed with oil which, passing through tubes to burners (which have been previously heated), becomes gasified and burns fiercely with a blue flame of great force and with excellent results. Among the advantages claimed, the following may be stated: There is an entire absence of smoke or smell at the outlet of the chimney; there are no ashes; no coal is required to start working, as a small quantity of paraffin placed in the trays of the burners and set alight will heat the burners in a few minutes, before turning on the apparatus; one man can attend to the work of firing that would require four or five men in ordinary coal firing, but arrangements could be made to work the machine automatically to a great extent; oil fuel will take up much less space than coal fuel—60 to 70 per cent less, at least.

Electric Flashes.

It is intended to construct a telephone line between Copenhagen-Berlin, via Hamburg and Kolding. The Danish administration has voted 217,000 kronen for this purpose.

A French railway has recently arranged its telegraph lines so that at a prearranged signal the wires are switched from the telegraph instruments to telephones, thus enabling the operators either to talk verbally or to communicate by the telegraphic code at will.

The District Commissioners have granted a permit to the Eckington and Soldiers' Home railroad to equip four miles of its line with the underground electric system owned and controlled by the Electro-Magnetic Traction Company, of which organization Senator Stewart is president and Senator Hunton vice-president.

Electric conduits of small vitrified stoneware sewer pipe laid in concrete on brick subways have been introduced in England. The conductors employed are naked copper strips which rest on insulators, the pipes themselves, each two feet long, resting on porcelain bridges, In order to join the conductor with a house connection, a special length of pipe is furnished, which is U-shaped for a part of its length. The house lead is taken out through an insulated movable cover forming the top of this part of the pipe. The joints are made on the Doulton system, and require no cement.

Gas lighting, which was common in London as early as 1810, was not introduced into Paris until 1819, and more than twenty years elapsed before its use as an illuminant became general in France. On the other hand, when we turn to the subject of electric lighting, it must be admitted that France has taken a foremost rank among the European nations in adopting the electric light. In Paris, electrically lit private carriages have, for the last five years, been extensively patronized by the affluent classes, but only recently has this process of lighting been applied to private carriages in London and Berlin. The Prince of Wales was the first to adopt it in London, and now we learn that the German Emperor has brought the resources of his active mind to bear on the subject of lighting carriages, and, as a consequence, the court carriages in Berlin are now lit by electricity, not only by outside lanterns, but also in the interior, which is illuminated by a series of accumulators carried in the vehicles. All over the harness are placed what the Germans call *Gluhlampe*, or small, colored lights, which glow like fireflies when the carriage is in motion.

Attorneys Disbarred.

Wm. R. Stringfellow, New Orleans, La. Raymond T. Gilbert, Illawara, La.

Want a Fountain Pen?

One of the very best in the market, a standard article, warranted, will be sent as a premium with THE INVENTIVE AGE. The retail price of the pen is $2.75. We will send the AGE one year and the pen for $2.75.

INVENTIVE AGE BUILDING.

PREMIUMS TO SUBSCRIBERS.

Read the following offers to new subscribers:

OUR $1 OFFER.

THE INVENTIVE AGE one year and two copies of any patent desired, or one copy of any two patents..... $1 00

THE INVENTIVE AGE one year and a list of 50 firms who manufacture and sell patented articles..... 1 00

THE INVENTIVE AGE one year and Altograph map of the City of Washington 1 00

THE INVENTIVE ACE one year and a five line (35 words), advertisement in our "Patents For Sale," or "Want" column, three times..... 1 00

For $1.

THE INVENTIVE AGE and any one of the following Scientific books:

How to Make Electric Batteries at Home, fully illustrated, by Edward Trevert.

Everybody's Handbook of Electricity, illustrated, by Trevert.

How to Make a Dynamo, by Trevert.

Practical Directions for Electric Bell Fitting and Electric Gas Lighting, by Trevert.

Elihu Thompson's What is Electricity?

OUR $1.35 OFFER.

THE INVENTIVE AGE one year and Joseph Allen Minturn's famous book "The Inventor's Friend," indorsed by such high authorities, as Dr. Gatling, Clem Studebaker and others.....$1.35
Book alone 50 cents.

THE INVENTIVE AGE one year and any one of the popular and instructive books as per offer in another column, under heading of "Popular Scientific Books."".....$1.35

THE INVENTIVE AGE one year and any one of the "Excelsior Edition of Standard Poets," mentioned elsewhere in this magazine.....$1.35

THE INVENTIVE AGE one year and a copy of "Picturesque Washington," 260 pp., 136 illustrations, Stilson Hutchins' famous book, former price $2, sent to any address in the United States..... $1 35

THE INVENTIVE AGE one year and The Peoples' Atlas of the World, one of greatest bargains ever heard of; size of Atlas 14 x 22 open; latest maps and statistics; handsomely illustrated, a $2 book with AGE one year—both for.... $1 35

☞ See another column for other offers.

OUR $1.50 OFFER.

THE INVENTIVE AGE one year and Robt. Grimshaw's famous book "Tips to Inventors"..... $1 50

Address all communications to

THE INVENTIVE AGE,
Washington, D. C.

THE INVENTIVE AGE can recommend the "Climax" watch, advertised in another column, as being, undoubtedly, the best stem-winder watch for the price in the market. It is a good time keeper, and either a plain or imitation engraved cases can be had. This watch is fully timed and regulated and fully guaranteed for one year, the same as Waltham or Elgin.

"BUBIER'S POPULAR ELECTRICIAN" is the name of a monthly publication which contains a vast amount of valuable information on all electrical subjects. Its department of "Questions and Answers" will be appreciated by students and amateurs desiring information or instruction on any problem that may arise. THE INVENTIVE AGE has made special arrangement whereby we can supply that popular dollar journal and THE INVENTIVE AGE—both publications one year—for $1.50.

Important to Commercial Travelers.

On and after December 1st, Baggage Agents of the B. & O. R. R. Co., will accept coupons from mileage books issued by B. & O. R. R., P. & W. R'y, B. & O. S. W. R'y and Valley R'y of Ohio, in payment for excess baggage charges, at their face value, 2 cents each. This arrangement will not include B. & O. Mileage Books endorsed "good only on B. & O.," B. & O. Southwestern Mileage Advertising Books, nor books older than one year from date of issue. 12-1

READ extraordinary premium offers in this issue—good to old subscribers renewing for another year as well as to new subscribers.

A CLASSIFIED list of Patents issued during the month appears in each issue of the INVENTIVE AGE, which keeps inventors posted in the art in which they are mostly interested. —— The full address of any patentee, and number of patent found below sent to any address on receipt of one 2-cent stamp. —— We will send, postpaid, to any address, printed copies of any U. S. patents, with specifications and drawings, upon receipt of 20 cents for one copy; 35 cents for two copies; 50 cents for three copies. —— (See premium offer elsewhere in this issue.) —— Address THE INVENTIVE AGE, 8TH AND H STS., WASHINGTON, D. C

LIST OF PATENTS

GRANTED FOR INVENTIONS,
JANUARY 29, 1895.

Advertising device. G S Ackley.
Air brake. S L French.
Air forcing apparatus. H Strater.
Ampere meter, recording. W H Bristol.
Amusement apparatus. G W MacKenzie.
Animal trap. H R Belden.
Apron supporter or suspender. J H Wolf.
Astronomical observations at sea, instrument for taking. W H Beehler.
Axle, separable wagon. H Hadden.

Baling machine. B F Hutches, Jr.
Baling press. C H Field.
Barrel elevator. M Lottin.
Barrel handling device. G H Spencer.
Bat, base ball. A Burrows.
Bearing, differential roller. J S H Holmes.
Beer, etc., apparatus for treating. M Warren.
Bicycle canopy. A B Penton.
Bicycle crank. N H Burton and J L Bradley.
Bicycle handle bar. W Carr.
Bicycle saddle. H S Josselyn.
Bicycles or tricycles, interchangeable coil spring motor and brake for. G K Rice.
Blind slat, window. G E Blaine.
Blower, rotary 3. T W Green.
Boiler. A Player.
Boiler. W F West.
Boiler alarm gage. A F Mallick.
Boiler moon braces, making. S A Pratt.
Bolt mechanism, safe. W H Hollar.
Bolt work, bearing for safe. W H Hollar.
Bonding collar. M M Jacobs.
Bone black, revivifying. M Weinrich.
Book holder, reference. W A Phillips.
Bottle stopper. J C Mitchell.
Bottle stopper. J Rosenfeld and S W Mackey.
Brass crucible furnace. E M Scoville.
Brick or tile kiln. A Gudeman.
Brick shipping device. T Parker.
Bung. C Schopf.

Calculating machine. A M Allen.
Calculating machine. C S Labofish.
Car brake, railway. R F Cooke.
Car buffer 2. W F Richards.
Car coupling. F Marquette.
Car coupling. J D Salts
Car coupling. D J Sinclair.
Car fender. R Atherton.
Car fender. H Stephan and A Schutz.
Car fender. J Taylor.
Car fender attachment. F Kryssing.
Car life saving guard. W T Lacon.
Car mover. H M Crippen.
Car platform, railway. C Bergman.
Car platform support. S A Crone.
Car replacer. J M Morris and S J Harkness.
Car replacer. D Q Walker.
Car safety guard. W B Champlin.
Car safety guard, street. A F Anderson.
Car skid, railway. C C Coggeshall.
Car wheel. J Player.
Carburetor. H Collett and M Merichenski.
Carding engine stop motion. H T Spencer.
Carpet beater. J J Hilton.
Carriage spring. T B Dowsley.
Casting metals. J A Potter.
Catheter or other tubes, method of and apparatus for making. J E Lee.
Cell cases, manufacturing. W E Williams.
Cereals, machine for extracting germs from ground. J F Gent.
Chain, drive. J H Mitchell.
Cheese vat heater. W E Kabat and H Hill.
Cigar tip cutter 2. W H Campbell.
Cigarette machine. D B Strouse.
Clasp for garments, corsets, etc. W H Payne.
Clay mill. H B Camp.
Cleaner. H L Knight.
Cleat, nautical. W S Grangor.
Clutch. A J Mosher.
Coal screen. P Spheicher.
Coal stone, etc., machinery for cutting. T Heppell, W and J G Patterson.
Cock for double gas burners, controlling. J B Wallace.
Commutator and making same, rectifying. H G Reist.
Concentrator. J Lampert.
Confectionery machine. J H Smith.
Cooking vessel. T A Bryan.
Copying press. F H Cutler.
Cord cutting machine. G F McCombs.
Cork cap. G C Coon.
Corking machine. G F Meyer.
Corn feeder and conveyer, automatic car. J S Burke.
Corset stay. C Scholl.
Couch roll. W A Hoffman,
Counter stiffeners, machine for making. N A Simonds.
Crate, folding. G Higgs.
Cuff. E K Betts.
Curbs or tubes from the ground, implement for removing. A L Clark.
Currents, system of distribution by alternating. C P Steinmetz.
Curtain fixture. J M Wheat.
Cut off, rain water. T C Belding.
Cutting tool. C T Ridgeley.
Cycles, combination pedals for. R Perkins.
Cylinder for engines, motors or compressors. C Sondermann.
Cylinder lock. J W McKee and C S Kennedy.

Dental engine. L T E Methot.
Dentist's crown swaging apparatus. A P Hays.
Digger. A Roll.
Door. J K Fagan.
Door. A H Stange.
Door hanger. W R Steuart.
Drawers support. E O Presby.
Drawing board and holder, combined. H E Butler.
Drawing board attachment. W Viellhaber.
Drawing instrument. F W Starr.
Drum. M E Converse.

Electric circuits, system of and apparatus for controlling. W B Potter.
Electric machines, apparatus for smoothing currents of dynamo. C E Scribner.
Electric machines, winding for dynamo. C P Steinmetz
Electric motor. C Wirt.
Electric motor controller or switch. W J Pohlman.
Electric signal, automatic. H C Storrs.
Electrical conductors, combined curb, gutter and conduit for. W Kingsley.
Electrical distribution of energy, system for and method of. W Stanley.
Electrical distribution system 5. C P Steinmetz.
Elevator controller levers, automatic lock for. A W Pettee and E E Hersh.
Engine steering gear, traction. F F Landis.
Engine stopping apparatus. L C E Meyer.
Eraser. L Gran.

Fan attachment, swing. C M Sherer.
Fastener for glass or other vessels. J Riling.
Faucet, measuring. G T McCroa.
Fence post, plastic. M Sweeney and I Groshaw.
Fence tool, wire. G R Kent.
Fence, wire. M Yakley.
Fencing, machine for making wire pickets. E F Shellaberger.
Fertilizer distributer. E Thomas.
File case index fastener. A Dorn.
Filter, water. W F Miller.
Fire escape and elevator, automatic. J Youngson.
Fireplace, gas burning. H G and W R Dawson.
Fireproof floor or ceiling. L S Pierson.
Fireproof wall or partition. G Liebau.
Flue expandor. D W Patton.
Fluid tester. N W Kronse.
Flush tanks for closets, inlet valve for. E M Knoblaugh, Sr., and R S Dawson.
Forge. S L French.
Fruit juice extractor. J Naylor, Jr.
Furniture base. L J Anderson.
Furniture, knockdown. H A J Rieckert.

Gage alarm. W A Stafford.
Game apparatus. M Thomson.
Game apparatus, coin controlled. M Hamlaughter.
Game for illustrating first reckoning, picture. E Trocletsch.
Garment hanger for car or other seats. S A Crone.
Gas burner, fuel. D Mitchell and E D Abbott.
Gate. E Mohn.
Glue stock for boiling, preparation of. E R Hewitt.
Grain binder. B T Brown.
Grain meter. B F Warner.
Grater, nutmeg. C A Prest.

Hay loader and stacker. F Jones.
Hoe or shovel. G B Hart.
Hose coupling. E T Winkler.
Hose support. G E Byrkit and F E Milburn
Hub, wheel. H L Boyle.
Hydrocarbon burner. J L Arnold.
Hydrometer. T A Willard.

Ice creeper. H Mayer.
Inhaler and respirator. J B Horton.
Injector and oil burner, air. J W Stanley

Jar and fastener. S J Dunkley.
Jigger and pulldown, combined. J Crossley.

Key ring. A Tweedale.
Knitting machine, circular. W R Dillmore.

Ladder, extension. P Johnson.
Lamp, electric arc. F Connady.
Lamp, electric arc. H O Swoboda.
Lamp, incandescent electric. G R Lean
Lamps, combined portable stand and wall bracket for incandescent electric. H Horn.
Lamps, etc., hanger for, C E Gillespie.
Latch. C H Little.
Lathe taper boring or grinding attachment. W Lawson.
Lathing, metallic. T B Wylie.
Leak stopper for ships or boats. N M S Donglass.
Letters, etc., receptacle for. W A Cooke, Jr.
Linotype for tabular work. C M Busch.
Liquid raising apparatus 5. F H Merrill.
Liquor cooler. F G Hodges.
Loading machine. J A F Svenson.
Locking box. A R Bingham
Locomotive, electric. S L Wiegand.
Loom for weaving Turkish carpets. R von Seydlitz.
Loom loose reed motion. W McMichael.
Loom pattern mechanism 2. W Wattie.
Loom shuttles, thread tension regulating device for. H Bardsley.
Lubricator. E D Bangs.
Lubricator. G W Mitchell.
Lubricator. E C Parker.

Mail bag. H Johansen.
Malting apparatus, grain. H C Baker and J W Free
Manhole cover for cisterns or wells. J Fowley.
Manuscript, etc., device for facilitating handling. W J Arney.
Map case. J M Alford.
Map, pocket. R L Stevens.
Measure automatic liquid. F E Lovejoy.
Measuring instrument, electrical. W H Bristol.
Measuring instrument, electrical. E Weston.
Mechanical movement. C C Moore.
Metallic articles, machine for heating. E Tolman.
Mica, grinding. R W Traylor.
Milk can or similar portable vessel. J R Grove.
Milk cooler. S L Brandt.
Mold and flask for chill rolls. A McLennan.
Molding apparatus. H Tabor.
Monocylic motor 2. C P Steinmetz.
Mop wringer. H J Gebhardt.

Negatives, making. J Stanton.
Nozzle spray attachment. J McBoyle.
Nut, axle extension. O Bagley.
Nut lock. M D Bowen.
Nut lock. J C Swan.
Nut wrench. G S Upshaw.

Oil burner, gas generating coal. E Cammerer.
Orange holder. W F Smith.
Ordnance, breech loading. H P Hurst.
Ordnance breech mechanism. C H Tesch.

Packing, piston rod. W Hillman.
Painter's fender. J L Lord.
Paper bags, means for binding and suspending packages of. W C Lynham.
Paper box ending machine attachment. H M Wrigley.
Paper cutting tool. C T Ridgeley.
Paper folding machine. F H Gilson and F E Reed.
Paper holder and cutter, roll. J Brandt.
Pen, fountain. W F Cushing.
Picture frame, folding. H R Hinckley.
Pile driver. H W Crouch.
Pipe or hose coupling. W G Trethewey and R H Brett.
Pipe thimble. A T Matthews.
Pipe thimble. W J Milsaps.
Pipe wrench. C Hall.
Plane, Rabbet. J A Trant.
Platform or scaffold, adjustable. G W Crnson and J A Dobkins.
Plow, agricultural. G Curtis.
Plow, side hill. C Anderson.
Pneumatic appratus. F E Duckham.
Pneumatic dispatch apparatus. A J Gillespie.
Pneumatic dispatch tube systems, receiver or chute for. F J Perry.
Pocket knife. J B Hardy.
Potato cutter. J A Criswell.
Potato digger. A P Goodell.
Powder to fabrics, machine for applying. J E Lee.
Pressure gages in position, device for attaching. S W Pratt.
Pressure regulator. E Jadwin.
Primary battery. R G Toode.
Printing machine bed motion, cylinder. L G Crowell
Printing press. W H R Toye.

Railway bonding device, electric. A J Zimmele and A Bournonville.
Railway rail circuit closer. E C Wiley.
Railway rail clamp. D B Rußner.
Railway signal. S W Babcock.
Railway signal. J R Jones.
Railways, automatic electric safety system for. R R nowden and A C Ives.
Rasin seeder. F Richardson.
Receptacle, convertible. S E Pander.
Rein holder. D H Blascow.
Rings, apparatus for manufacturing finger. F R Stafford.
Roofs, machine for applying plastic, etc. to. T Connor.
Rope coupling. D C Trester.
Rotary engine. F M Bailey.
Rubber, roll for machines for working. F H Brewster.

Sash fastener. W F Sinley.
Sawmill carriage, offsetting. D B Hanson.
Sawing machine, granite. G Green.
Scaffold, adjustable. L Mandel and W Groszmann.
Scale, prescription weighing. C H Fitch.
Scraper, wheeled. P Decvy. (Reissne)
Scrubbing and drying machine for floors, etc. R L Bownton.
Seal. B Fox.
Sealing machine, bottle. E V Clemens.
Sectional boiler. W H Page.
Sewing machine. E L Laperriere.
Sewing machine. W G Tillou and J W Clapp.
Sewing machine and secretary, combined. G W Stewart.
Sewing machine, edging. E and R Cornely.
Sewing machine shuttle. W G Tillou.
Shade cloth, machine for preparing. W P Cole.
Shaft supporter, vehicle. H K Porter and F V Wooster.
Sheep dipping device. F M Welshimer.
Shoe repairing jack. T A Meitz.
Shoe vamp marking and creasing machine. A B McCoy
Sieve, flour sifting. F Schlee.
Sifter, ash chute. H E Buck.
Signal operating and controlling machine. W L Masters.
Sink, flushing rim slop. H M Hoelscher.
Slate cutter and trimmer. J E Ernest.
Slicer, vegetable. C Beuttel,
Soap tablets, making. G D Macdougald and J Sturrock.
Socket wrench. M Brassell.
Soldering sheet metal cans, machine for. R Gregg.
Stage mechanism theatrical. M L Fuller.
Stamp attaching device. H C Aubel and S Stuckey.
Stamping spoons, etc. E Tolman.
Steam boiler or water heater. H B Tatham, Jr.
Steam engine 3. M C Bullock
Steam engine. N Chandler.
Steam engine, direct acting. J D Gray.
Steam generator. H Hyde.
Steam generator. C C Mulford.
Steering gear, vessel. M Schmaltz.
Stove. C J Griffiths
Stove, lamp. D W Cole.
Stove, lamp. W C Furrey and J W Hellman.
Stovepipe fastening. G R Malone.
Straw stacker attachment. W Brenton.
Street sweeper. C M Kimball.
Stump or rock puller. F Chagnot.
Sugar wagon. J Graves.

Telegraph, signaling. F A Turner.
Telephone switch board apparatus C E Scribner.
Telephone switchboards, spring jack for. C E Scribner.
Telephone system. J I Sabin.
Telescope, microscope, and camera, combined. R L Stevens
Thrashing machine. W L Butler.
Thread cutting brace. E L Barton.
Tire, pneumatic. A Straus.
Tires, means for inflating pneumatic. J Danischevski.
Tool, builder's combined. E E Mohn.
Torpedo setting device. C K Haynes and W L Klinck.
Track sanding apparatus. M S Starkweather.
Truck. J R Long.
Truck, bag bag holder, scale, and lifting apparatus, combined. R J Blake.
Truck bolster and spring plank. L B Smyser.
Truss. Dekersen.
Tube cleaner for circular tubes. W F Bradbury.
Tug, thill. W Carton.
Twisting machines, tension device for silk. G Singleton.
Type bars, machine for producing. J C Fowler.
Type distributing mechanism. J C Fowler.

Uterine stem, intra. F C Ferguson.

Valve, cut off. C A Marrder.
Valve, engine. C S Farrer.
Valve gear. W Engberg.
Valve gear. J B Stanwood.
Valve mechanism, cut off. A K Mansfield.
Valve, radiator. H Eisert and R B Talcott.
Valve, register. H Bolthoff.
Vehicle, road. A M Allen.
Vehicle running gear. M Maher.
Vehicle running gear. G T Wilson.
Vehicle spring. A W Burdick.
Vending machine. A and O Jaeger.
Voting machine. J McTammany.

Wagon bolster stake. A Conrad.
Wagon brake. D Shannon.
Wagon tower, adjustable. S E Harthan.
Washing machine. A Amundsen and P Peterson.
Washing machine. H Schafer.
Washing machine. F Traub.
Water, etc., mechanism for discharging. J G Hermes.
Water raising apparatus. F H Merrill.
Water tube boiler 2. C S Hopkins.
Wheel rims, method of and apparatus for bending. H G Shepard.
Winding fabrics, etc., into rolls, machine for. J E Lee.
Window screen. C C Wheeler.
Wire structure tie. E L Williams.
Woodworking machine. A Hirshheimer and C M Mueller.
Wrench. F A Carrithers.

PATENTS GRANTED FEB. 5, '95.

Adjustable table. J R Baker.
Advertising-board. F L Chrippell.
Air-moistener. C H Cushman.
Album and Bible. Combined. G Clay.
Amalgamating apparatus. T J Lovett.
Anchor. C R Reeves.
Animal trap attachment. R L Brooks.
Anvil, vice, and drill, combined. J Weathers.
Atomizer. T E Orgram.

Ballot box. R P Kingman.
Barrell support. H F Stagman.
Barrell support, adjustable. R Walker.
Bathing apparatus, electric. C Dochring.
Batter dropper. E L Lomax.
Batteries, separator plate for storage. P G Salom.
Battery for drawing off and liquoring massecuite. O Mengelbier.
Bearing, roller. J D Mattison.
Bearings, making roller. J F Steward.
Bed pan. M S Diamond.
Bedstead, folding or knockdown. J Montgomery.
Beer cooling device. O Ritter.
Beer, method of and apparatus for carbonation of. O Zwietusch.
Berth, self leveling. T F Wells and T W Sanford.
Bicycle brake. I W Litchfield.
Bicycle holder and lock. J O Taylor.
Bicycle lock. C A Sullivan and P J Sweeney.
Bicycle steering gear. M D Smalley.
Binder, temporary. W C Stahle.
Body loop and shackle, combined. C A Behlen.
Boiler. C Carroll and J McNulty.
Boiler feeder. M Gregson.
Boiler tube beader and expander. D J McCormack.
Bone cutting machine. C J Callahan.
Bone, manufacturing artificial. R Reiman.
Boot or shoe jack. J I E Nelson.
Boot or shoe, spring heel. W P Bradford.
Bottle, ink. J Desmond.
Bottle, nursing. J T McBride.
Bottles, 2 antirefilling device for. V Belanger.
Box manufacturing machine. R Schleicher.
Box mover. F D Basnett.
Box partition and machine for making, caramel. W E Henry.
Brake beam. H B Robishung.
Brick, device for squaring soft. O A Dodge.
Brick drying apparatus. A Ittner.
Broiler or toaster. U D Seltzer.
Broiler or toaster, electric. L T Edwards.
Broom bracket and coat hook, combined whisk. J J Hilton
Brush, rotary. H A Webster.
Buckle and buckle shield, combined. R J Goerner.
Buffing pad for appliance. A E Perry.
Buoy, elecrically lighted. I W Henry.
Burial casket. F Schelkovski.
Buttonholes, clamp and guide for working. C Donovan.

Calipers, watchmaker's. P Jander.
Can opener. J Gould, Jr.
Cane and camp stool. J M Kincade.
Car brake. R C Snowden.
Car brake, adjuster. M E McKee.
Car buffer. W F Richards.
Car coupling. D Boyer.
Car coupling. D R Joslyn.
Car coupling. A Schneider.
Car door. A Brill.
Car fender. A H Faulstich.
Car fender. F Sprick.
Car fender, automatic. H P Barney.
Car for collecting and conveying turnings. J A Bidwell.
Car, poultry. J B Mockridge.
Car running gear, electric. C A Jackson.
Car safety apparatus, street. O R Routh.
Car safety attachment, street. C E R Christensen.
Car safety guard. S F Clouser.
Car step, extension. T Thatcher.
Car, stock. J Mock,
Cars, side bearing for railway. 2 J C Wands.
Carpet, woven. M J Whittall.
Carton. F B Davidson.
Case for powder, seed, &c. D C McNaughton.
Caster. J Berkey.
Casting apparatus. H G Underwood.
Casting, method of and apparatus for. H G Underwood.
Ceiling, metallic. J Old.
Ceiling supporter. J E Meyenberg.
Cell case. W E Williams.
Centering machine. H N Kennedy.
Cereals for food, machine for reduction and preparation of. H D Perky.
Cereals for food, roll machine for preparation of. H D Perky.
Cereals for food roll machine for reducing 3. H D Perky.
Chain wrench. S Morcan.
Chains, making. R A Breul.
Chair. W C Hood.
Chill. A Carbett.
Chuck, drill. J Ulrich
Churn power. J H Goodwin,
Clamps, machine for punching and forming. P F Cassidy.
Clay mill. D A Munroe.
Cleat for holding ropes, cords, or chains. C A McEvoy.
Clip for brake staffs, shafts, &e. A W McCaslin.
Clock. A Craig.
Clutch. W A Murphy.
Clutch, friction. J H Cox.
Coal handling machine. C E Wolle.
Coal screen. W O Gunckel.
Combination lock. E Stockwell.
Compass, mariner's. J A Hooper.
Conduit system. C M Yost.
Convertible chair. J G McCaffrey.
Conveyer spiral. A G Mather.
Cooking utensil, steam. S W and C A Kinney.
Cooking utensil support. L P Converse.
Corn cutting machine, green. S E and W W Morral.
Corn sheller. T H Tabor.
Crib, folding. F C Hoagland.
Cultivator tooth, plow. T Van Beck
Cutter guide. J H Howard and W A Scoggan.
Cut off, rain water. C H Rohde.
Cycle, circle. E I Brannan.

Dental burr. J D Wildens.
Dental handpiece 2. J D Wilkens.
Dental motor apparatus, electric. F F Denison.
Dental tool. B F Philbrook.
Desk. F Keller.
Door. K Belcsak.
Door brace. G A Goodrich.
Door check. G T Wilson.
Doors, device for unlatching and opening. D W Tower.
Dough board and barrell cover, combined. W A Roberts.
Drawer support, antifriction. H K Turner.
Drawing instrument. H A Kleist.
Dredger hose guard. W B Pless.
Dredgers, spud gearing for. W B Pless.
Dredging apparatus. W B Pless.
Drum, packing or shiping. J H Preater.
Dye, black azo. M Hoffmann.
Dye, blue. M Ulrich and J Bammann.
Dye, red basic. C Schranbe.

Egg beating machine. W Hagley.
Electric conductors, safety connection for. R E Bates.
Electric light globes, cover for. H Johansen.
Electric lighting, rosette for. E W Buffinton.
Electric machine, brush for dynamo. J W Dickey.
Electrode, telephonic or analogous. T Mc Coubray.
Elevated carrier 2. G W Wood.
Elevator. A C See and W L Tyler.
Engine indicator attachment. F W Collins.
Engine indicator, steam. W Houghtaling.
Engine stopping apparatus. F D Taylor. (Reissue)
Engine, antomatic regulator for steam. H A House.

Envelope fastener. E E Hickok.
Evaporator, fruit. F L Ledford.

Faucet or valve. G L Savage.
Feed water heater and purifier. A C and W B Brancher.
Fence making machine, slat and wire. C S Hensley.
Fence post. C Boyd and F S Gordon.
Fence post. J J Singley.
Fence, wire. L M Will.
Fences, stay wire fastener for wire. H L and W G Phillips.
Ferrule, plumber's. J J Phelan.
File, bill. B P Critchlow.
Filter, cane juice. L Boyer.
Fire alarm and police signal box, electric. G E Paynter and W H Thompson.
Fire escape. H F and L Pokorny.
Fire escape, safety device. E C Smith
Fire extinguishing systems, valve for. C Neracher.
Fire extingnishing systems, valve machanism for. C Neracher.
Fish hook. J T Hastings.
Fish hook. D M Kittle.
Fishing reel. A E Peck.
Fishing tackle G A Larsen.
Fluid engine. I H Spencer.
Fluids from solids, apparatus for separating. E J O'Brien.
Folding table. J Vandenberge.
Fruit, machine for perforating and grading. G O Luce and H M Barngrover
Fuel, artificial 2. M Nirdlinger.
Fuel, machine for manufacturing artificial. M Nirdlinger.
Furnace. C B Thompson.
Furnaces, apparatus for burning petroleum in. W Booth.
Furnaces, gas purifier for blast. W L Wallis.
Furniture, spring support. S U Williamson.

Game counter. J M Clark.
Garbage burning apparatus. N Dowling.
Garment hook. F Spitz.
Garment openings, binder and fastener for. E A Bailey.
Garment supporting clasp. F D Harding.
Gas burner. J F Busey.
Gas engine. E J Stoddard.
Gas, making illuminating. W Yonng.
Gas or vapor burner. H A House.
Gas or vapor burner for heating purposes. H A and H A House, Jr.
Gear, variable driving. G B and A F Robinson.
Gilt board. J and L Schram.
Glass and making same, wired. E Walsh, Jr.
Glassware, machine for manufacting. C Ulfig.
Gold, &c. separating and amalgamating machine for. T F Upson.
Grease separator. W J Baldwin.
Grain, pulsating water separator for removing rock, grit or foreign from. J H Montgomery.
Grain separator feeder. J B Cornwall.
Gun breech mechanism. J E Bott.

Hammer, power. W H Botting.
Handle for coffee pots, &c. W B Johnson.
Harvester, corn. W R E Tharp.
Hasp. M C Hutton.
Hasp lock. W E Deibert.
Hat stand. S A Ayerst.
Hay rake and loader. C E White and C P A Friberg.
Heating and ventilating apparatus. H A Fryslie.
Hemmer. R W S Mitchell and J Murphy.
Hinge and support, combined. F W Tobey.
Hoisting and conveying apparatus. L Rosenfield.
Horse boot. G Ioset.
Horse power. E J Wood.
Hose coupling. J Gates.
Hose coupling. W L Walker and W A Nelson.
Hose supporter. P Now.
Hot air registers, vaporizing device for. H Beatty.
Hydrogen generating apparatus. W and T Hawkinds.

Index, book. J Hon.
Indexing cutter. J T Cormody.
Insulated conductor. H G O'Neill.
Irrigating and burning machine, combined. G Ainger.

Joist hanger. P Riesick.

Kegs, barrels, &c. making. H C Campbell.
Knob attachment. C O Case.

Ladder service, store. E M Murray.
Lamp, cycle, C A and F J Miller.
Lamp heater. L P Converse.
Lamp lock, electric. W A Saul and J H Peck.
Lamps, construction of oil. J H Ross.
Lamps, method of and means for testing incandescent. F S Smith and J A Vandegrift.
Lantern, bicycle. W L Keene.
Lattice. W S Hull.
Lemon squeezer. J L Easley.
Letter box. H J Witte.
Lid lifter. W B McGoldrick.
List or index holder, adjustable. W Paige
Loading and conveying apparatus. A J Frith.
Locomotive. H A Luttgens.
Locomotive exhaust mechanism. J C Heron.
Loom pick measuring device. J Lancaster.
Loom shuttle tension device. S M Hamblin.

Mail marking machine. F N Ethridge.
Mandrel. R S Peabody.
Match box. M Holm.
Measuring machine. J J Grant.
Measuring strap. A S Adler.
Metal bars, machine for straightening. H J Leighton.
Metal, tool for bending band. A J Weed.
Metals by electrolysis, apparatns for refining. H A House.
Mineral wool, mannfacturing. T S B Wood.
Mold sanding machine. E O Leach,
Monkey wrench 2. J P Lavigne.
Muzzle. C D Lipscomb.

Oar. C O Hodges and G H Gardner.
Oiler, loose pulley. J Braithwaite,
Orange wrapping machine. H J Williams.
Oranges, &c. device for removing skins from. C Sonnesen.
Organ feeder. J Pelonbet.
Organ, portable. P P Bilhorn.
Ornamenting surfaces. J and L Schram.
Oven, baker's C Lienhard.

Pail, dinner. H Hibler.
Paint and rust, composition for removing. R W Pfaffle and G L North.
Paper drier, lath and chain. W H Greenwood.
Paper, machine for drying coated. L Dejonge, Jr.
Paper or like material in sheets and drying same, machine for coating. L Dejonge, Jr.
Paper, package for sheathing. M E Chatfield.
Paper registerering machine. T C Dextar.
Paper roll, expanding plug for arbors of. W R Farnsworth.
Pavement. J S Rowell.
Pavements, apparatus for repairing asphalt. J R Penberthy.
Photographic print holder. H A Stimson and C J Isaacson.
Piano. M H McChesney and J G Knnze.
Piano action. H Jacobi.
Pianos, fall board and swing desk frame for. C A Pfeiffer.
Pianos, making open work panels for. O A Kimball and J Gramer.
Pipe wrench and cutter. P Bartzen.
Pitman. T C Mullenix.
Planter, check row corn. A Frey and W Knox.
Planter, harvester, hay rake, and cultivator combined. J Ehrhard.
Planter, potato. J S Greenleaf.
Planter. seed. J A Mengal.
Plaster, building. W H Aiknan.
Pototo cutter, seed. J W Ceirus.
Powder receptacle and measure, combined, R Wind.
Pressure gage indicator. C W Siver.
Pressure regulator. C E Van Anken.
Printing machine, envelope. C F Taylor.
Projectiles, causing rotation of. W T Unge.
Propelling mechanism, boat. J Smith.
Pump, automatic hydraulic air. G J Keenan.
Pump, lift. P E Wistrand.
Purse frame. L B Prahar.

Rails or other metal bars, machine for straightening. H J Leighton.
Railway, cable. M W Sewall.
Railway, conduit electric. W H Baker.
Railway, conduit electric. A Rosenholz.
Railway crossing. S J Austin.
Railway crossing gate. G W Mershon.
Railway crossing, oblique. S J Austin.
Railway crossing signal, antomatic. S Keller and W A Sharp.
Railway danger signal, pyrotechnic. F A Fox and D H Roberts.
Railway, electric. J G Donty
Railway subway, electric. F E Button.
Railway switch work, pattern for. A J Moxham.
Railway switch work, pattern for. H O Shea.
Railway ties, apparatus for saturating. I Loughborough.
Recording device. A C Kintner.
Refrigerating safe. J C Wright.
Refrigerator shipping box. T Drummond.
Respirator. B Loeb.
Roll holding camera. C H Stoelting.
Roofing. C H Dalrymple.
Rope clamp. H Vachon.
Rotary engine. R Hewson.
Ruler, parallel. A S Cooper

Sad iron. G Heidel and I E Reis.
Safety device. E Hesketh and A Marcet.
Sandpapering machine. W S Fuller and T R Capwell.
Sash balance alarm. W H Belton.
Sash fastener. S E Jackson.
Sash fastener. P D Mitchell.
Sash fastener. B F Rathbun.
Sash lock. W D Lawrence.
Sawmill set works. D B Hanson.
Saw set. H Rupsch.
Saw swage. S U Lockwood.
Sawing machine, multiple cold. C C Newton.
Scale, supension. A Farmer.
School seat. W C Hood.
Scow, dumping. O Dahl.
Scraper, wheeled. H J Schneider.
Screw blanks, manufacture of. H K Jones.
Seam board and stretcher. J H Doyle.
Sewing machine. A Eppler.
Sewing machine feeding mechanism. W J Stewart.
Sewing machine, shoe. G R Peare.
Shade bracket, adjnstable. W F Nunemaker.
Shade holder, curtain C E Dodd.
Sheet metal can. H Bokelmann.
Sheet metal hollow ware, ornamental. A Wanner, Jr.
Shirt. T H McDonald. (Reissne)
Shoeing stand, farrier's A A McHugh.
Shot case and measure. R Wind.
Sifter. O M Morse.
Signaling, pyrotechnic. N J Halpine.
Siphon head. S Triller.
Smoke consumer. P Geiser.
Speed regulator. N Lombark.
Spikes, machine for manufacturing. W Goldie
Spinning and twisting machine separator. W H McDavitt.
Spont, pail. F Everts.
Stalk, artificial. E Hell.
Stamp affixer. B Kennedy.
Stamp, hand. C A Thompson.
Stapling machine. R Brownson.
Stay, dress. G Kendrick.
Steam boiler. J Hughes.
Steam engine. W Brameld.
Steam generator. J E Dame.
Steam generator or hot water heater. J S Valentine.
Steamer, face. F C Goodman.
Stop motion. H E Hawes.
Stovepiper coller. A J Taylor.
Strainer for downsponts, detachable. J O Shriner.
Strap fastener. F L Moore.
Straw burner. E J Vraalstad.
Straw berry runner cutter. C D Carter.
Stump extractor. C N Blood.
Table. T J Williams.
Tack driving machine. D B Nye.
Tannin compound. J Meyer.
Tap, collapsible. S A Ekehorn.
Telephone arm rest and receiver holder. W Stenbing.
Telephone exchange. M Brooks.
Telephone switch, antonatic. H D Bayne.
Thill coupling. W J Powers.
Tile roofing. A H Hettich.
Timber, preserving. J S George.
Time indicators, device for starting or stopping. C F Marvin and J P Friez.
Time recorder or ticket stamp. L E Paddack.
Time recorder, workman's. C A Widmer.
Tire for vechile wheels, elastic. C C Campbell.
Tire, pheumatic. K Brown.
Tire, pheumatic. J J Kaetzner.
Tooth powder, apparatus for applying. J S and R M Sanger.
Toy. J H Torney, Jr.
Transplanter. H P Meetze.
Trolley for underground conduits. C M Yost.
Truck, car. J M Austin.
Truck, hand. M McQniston.
Truss. H B Shriver.
Truss. J Yonng.
Tune disk. A Richter.
Tuning pin socket for stringed instruments. C W Peck.
Turning or beading machine. Q W Booth.
Type casting and composing machine. F A Johnson.
Type writing. machine. A B Dick.

Valve for steam pumping engines. R L Frost,
Valve indicator. C W Siver.
Valve system for fluid pressure chambers. N Curtis.
Vaporizer and burner, retort. P Betts, Jr.
Vehicle brake. J F Sinkler.
Vehicle brake, automatic. V A Kemper.
Vehicle draft attachment. H B St. John.
Vehicle running gear. W J Kauffman,
Vehicle spring. C L Thomas.
Vice. S O Root.

Wagon, milk. T H Williams.
Wagon wrench. G B Dunham.
Watch. F Moeri.
Watch. pendant setting. E Genevay and J A Randolph.
Water closet. H E Greenwood and J W Grantland.
Water closet and apparatus connected therewith. H Sutcliffe.
Water closet flush tank and valve. M Hogan.
Water closet flushing mechanism. F W Stone.
Water closet seats, device for fastening. C S Frishnmth.
Water elevator, diaphragm. J B Erwin.
Water tanks by freezing, method of and apparatus for preventing closure of. C Ladd Davis.
Water tower and fire escape, combined. F M C Hughes.
Water wheel, turbine. J W Stults.
Watering trough, antomatic. T L and C L Regester.
Wavers or curlers, detachable holder for. W D Shaw and E Schaefer.
Windmill. E C Bongardner.
Windmill. G P Youmans
Windmill tower. G P Youmans.
Wires, clamp for cross. A Lovedahl.
Yarn roll and making same. S W Wardwell, Jr.

PATENTS GRANTED FEB 12, '95.

Addin and daily receipts registering mechanism, cash. J H Voss.
Aerating beer or ale, device for. M H Hart.
Air compressor. J F Blake.
Air purifyidg device. C Peters.
Alloy, quarternary. P F deSnsini and E A L Langlois.
Altitudes at sea, instrument for obtaining. R T Morehouse.
Amalgamator, gold. A and J W Carlson.
Animal trap. J Sherrett.
Ankle support. A Sessler.
Aquarium. L Ruhe.
Armature coils, apparatus for winding. H Geisenhoner.
Armature for dynamo electric machines. H F Parshall.
Armature winding. D P Thomson.
Armor plates, Manufacturing. A Schmitz and E Ehrensberger.
Auger bit. A L Adams.
Autolyre. A M Ross.

Baling press. H Deitz.
Ball apparatus for practicing golf, &c. captive. R G Graham
Bearing, ball. W Meeker.
Bed and table, combined folding. H Hassiepen.
Bell striker, antomatic. E Rogers.
Belt snpender. J Freeman and F D Marble.
Bending machine, roller. C P Higgins.
Bicycle. H D Moise.
Bicycle saddle. L L Richmond.
Binder, temporary. R R Vernon.
Blind slat rod. W H McFarland.
Block system signal, electric automatic. J B Stewart.
Blower, steam jet. W Storm.
Boiler furnace, steam. J Smithley.
Boiler furnace, steam. T York.
Bolting apparatus. C F Hardy.
Bootjack. G C Ferguson.
Bottle cap. W H Northall.
Bottle stopper. G F Atwood.
Bottle stopper. G S Chamberlin.
Bottle stopper. B Ramsay.
Box making machine. A Carey.
Bridge. G N Clymer.
Brnsh. J A Sampsell.
Brushing machine. E Waters.
Bulletin board. M Petry.
Bumper. W E Hill.
Burial casket. J P Hill.
Burial casket lining. J B Louden and W G Stemmel.
Burial vanlt. C W Spencer.
Button attaching machine. W E Elliott.

Cabinet, work. M S Mason
Cake machine. H Hneg.
Calipers, micrometer. O J Ebert.
Candle holder, crimper, and cutter, combined. A J Carter.
Cane, &c. apparatns for expressing sap or juice from. D Drummond.
Car brake, railway. S P Mitchell C L and M B Schuppe.
Car brake, railway. J M Smith.
Car coupling. P Brown
Car coupling. C L Buswell.
Car coupling. J Gilliland.
Car coupling. B B Moss.
Car draft-rigging, rai way. T B Kirby.
Car fender. A Pierra.
Car fender. C W Stringham
Car fender, street. G Lundberg and C H Mattice.
Car life saving guard G Mauro and F Renzo.
Car motors or other electrical apparatns, regulating device for. H F Parshall.
Car safety attachment, street. A E Hughes.
Car wheel chill. W Fawcett
Cars, means for mounting dynamos on railway. W Biddle.
Carbon, arc lamp. E Thomson.
Carbon filaments, manufacture of. T A Edison.
Cardboard grooving machine. L Nicolai.
Cards, draw or box for holding index. H J Hall.
Caronsel. M T Weston.
Cash register. E K Heller.
Chain, drive. T B Jeffery.
Chair. J D Howe.
Chair base and spring support. J Harringtou.
Check book. W Maloney.
Check rower and drill corn planter, combined. E K Hayes.
Chimney cap. W Mackert.
Chocolate dipping or coating machine. W Walter.
Churn. J B Beam.
Cistern, means for cleaning. D J Daly.
Clapboard gage and marker. W S McCrea.
Clasp. G L Smith.
Clock synchronizer. H S Prentiss.
Closet range, washout. J Clifford and J H Gavin.
Clothers drier. H W Libbey.
Coal drill. O P Swanson.
Colter. J H De Bruce.
Combination lock. I Summer.
Compass, beam. C F Heinkel and G Weber.
Compasses, electrically operated regarding instrument for. C L Jaeger.
Compound engine. A von Borries.
Controller, series perael. E D Priest.
Conveyers, compensating gearing for. J M Dodge
Cop, multiwonnd. S W Wardwell, Jr.
Cot J Sevcik.
Cotton chopper. N H Newton.
Cottor gin, roller. J E Coleman, Jr.
Cotton gin saw. J W Cooper.
Cover for milk or other cans. A Ernst.
Cover, trying pan. D Cleary.
Crank arm. G A Brachhausen and A Wolff
Crimpling machine W Todd.
Cultivation apparatus, steam. R H Fowler T Benstead J Ogleby and H Evershed.
Cultivator. R A Bondreaux.
Cultivator. J H Knapp.
Cultivator, corn. S S Gerrish.
Cultivator head, adjnstable. J N Clonse.
Cultivators, slide for tongueless. J D Monaghan.
Current motor, alternating. R H Hassler.
Cut off meehanism for stand pipes. R McGowen.
Cycles, racing index for home trainer. A L Knighten.
Cyclometer. J E Bean.

Dado clamp. J T Frazier.
Dehorner. H W Leavitt.
Display dard and holder. W F Jones.
Door fastener. J A Hickok.
Dredging apparatus. J Gwynne.
Drier for brewers' grains, &c., P B Taylor.
Drilling machine. A J Smart and C E Martin.
Drying cylinder, rotary. J Mandot.
Dust collecting device. O R Moffet.
Dust collector. J H Holland.

Electric battery. J M Wells.
Electric conductor tip. A Metzger.
Electric controller. G F Card.
Electric machine, alternaring current dynamo. A Ekstrom.
Electric machine, dynamo. R Fuller.
Electric machine, dynamo. E Thomson.
Electric exchange system. G W Hey and A E Parsons.
Elevating and conveying mechanism. J M Dodge.
Elevator cnp attachment. W H Emerson.
Embroidering machine, hand. F Ohl.
Enameling metal. J Cochran.
Engine roll, jordan. E W Barton.
Excavator. A Barhite.
Eyeglasses or spectiacles, attachment for. H Franc, Jr.

Feed water regulator. C A and H F Straub.
Fence machine, wire and picket. D A Green.
Fence, panel. G B Bruce.
Fence post. S Leffler.
Fence post. G W Leuty.
Fence post. W Van Wert.
Fence stay, wire. E E Myers.
Fence stay, wire. J W Snoleker.
Fence, wire. E H Stowell and G W Terry.
Fiber disintegrating machine. J M Holmes.
Fifth wheel. H C Swan
File, bill. A H Swank.
Filter. L B Hoit.
Filter. J C Wands.
Fire alarm apparatus. S W Ludlow. (Reissue)
Fire alarm, recoil operated. A Mieg
Fire extinguisher. hand. S M Stevens.
Fire proof floor structnre. T Bailey.
Fire through buildings, means for preventing spreading of. J D Baker.
Flushing tank. T C Beaumont.
Foot gear pattern, [illegible]. A L Prince.
Furniture. M Y Warren.
Furnaces, cement ring for blast. E C Fox.
Furniture, convertible. E S Smith.
Fuse. S Adamson, Jr
Fuse block and socket. F W Mould.

Galvanic battery. W P Freeman.
Gas apparatus. E Dietrich.
Garbage, &c. extracting and evaporator for. F G Wiselogel.
Garbage, process of and apparatus for treating. E Holthaus.
Garbage, treating. E Holthaus.
Garbage treating apparatus. E Holthaus.
Garment clasp. C F Roper.
Garment stretching apparatus. R C and G A Rutherford.
Garment supporter clasp. F D Harding.
Gas engine. J W Lambert.
Gas engine. F A Rider and S Vivian.
Gas generator. J H Miller, Jr.
Gate. W B Whittenberg and A L Hawkins.
Gate opening mechanism. W Wise.
Grinding machine. W E Cook.
Grinding wheel J H King.
Gun, magazine. G T Fogerty.
Guns, safety breech lock for. L V Benet.
Guns, safety lock for machine. L V Benet.

Hammer drop. F A Pratt.
Handle. I Pierce.
Harrow disk sharpener. G B Stiles and L F Chrestenson.
Hat and coat hanger. G Anderson.
Hat block. J Marshall.
Hay frame brake. P W Pursley.
Heat regulating apparatus, automatic. W Waters.
Heddle making machine. J Benazet.
Heel edge burnishing and finishing machine, boot. C H Southall.
Induction converter. T A Edison.
Inhaler F Forne.
Injector R G Brooke.
Inkstand cover. H C Phillips and J Palmer, Jr.
Insect exterminator. G B Twyman and M E Thomas.
Insect exterminator. H Wagne.
Jacket and waist, combined. M Loewenthal.
Joints, machine for grinding ball and socket. F Brandes.
Journal bearing, roller. B Beaupre.
Ladder and portable platform, scaling. W H McKiever.
Lamp. J Funck.
Lamp, argand. T Hipwell.
Lamp, electric arc. T Spencer.
Lamp filament, incandescent. T A Edison.
Lamp, incandescent electric. T A Edison.
Latch and bck combined. E N Beebont.
Lathe. E J McClellan.
Lathe, wood turning. D T Matthew and A T Collier.
Lead trap and making same. J F Wolff.
Leather, manufacturing articles of sole. M Frank.
Leg, artificial E Chapman.
Letter boxes, construction of. F C onrad.
Loader, coke or coal. W Wright, C Keef, and J E Strong.
Locomotive, electric. E M Boynton.
Locomotive or other water tube boiler. G J Perkins.
Loom reed. A Weithaase.
Lubricator. J Powell.

Magazine camera. A Lundelions.
Magnesia, making light carbonate of. H Endemann.
Magnesium carbonate, making light. H Endemann.
Magnesium carbonate, making light basic. E Rneff.
Match box, self light. A Rothschild.
Mathematical and drawing instrument. A M English.
Measuring apparatus. A Y Reeder.
Measuring vessel. J A Hooper.
Metal drilling tool. F A Pratt.
Mill alarm device. C L Judge.
Milling machine. A Whitney and J Johnston.
Milling tool. A H Kent.
Moistener sealer, envelope. J M Dempsey.
Molding and making same, ornamental. W M Terriberry.
Mower, lawn. F H Zohe.
Musical instrument, R Essig.
Musical instrument. H E Geisendorff
Musical instrument string clamp. H W Hafer and J O Love.

Nail set, combination. J Dowling.
Nut lock. J W B Cook.
Nut lock. W A Matter.
Nut lock washer. F P Hinds.
Nut tapping machine. W J Sleffel.

Oil burner. H C Hornish.
Optometer. H A Huntington.
Ordnance, construction and operation of. J Faust.
Ore crusher and amalgamator. J Sutherland.
Organs, cell and valve for reed. A N Ostland.

Packing box. D S Wing.
Packing, piston rod. T H Holmes.
Pamphlet covering machine. G W and H C Hull.
Paper feeding machine. T C Dexter.
Paper weight and clip. W G Adams.
Pen, fountain. F C Brown.
Pencil or pen holder for slates or drawing boards. P E Hamnm.
Picture mats with circular openings or holes, apparatns for cutting. M E Childs.
Pigments, apparatus for manufacture of metallic. A C J Charlier.
Pipe fastener. H N Davies.
Pipe section, angular. F A Swan.
Plant supporter, adjnstable. J E Hutchison.
Planter and fertilizer distributing attachment for plow, seed. A D Simpson.
Plating for vessels, &c., W Stewart.
Plow, chopper, and planter, combined. N H Newton.
Pressure gage, steam. N W Pratt.

Pressure regulator. J D Brassington.
Pump R H Horton
Pump, centrifugal. S Hughes.
Pump cut off mechanism for stand pipes. R McGowen.
Pump, force. G W Aldrch.
Pump plunger attachment. J Burke and O L McKune.
Pump suction pipe. F Betts.
Punch and register, ticket. W T Jenkins.
Radiator. C A Ball.
Rail bending tool. J R James.
Rail clamp. G W Parsons.
Railway conduit system, electric. F S Davenport.
Railway crossing. R Fuller.
Railway distributing system, electric. W H Knight.
Railway signal semaphore. D H Wilson.
Railway signal, track operated. G M Chace.
Railway signal apparatus. C L Fielder.
Railway spike. G G Rhoderick.
Railway supply system, electric. M Wheless.
Railway switch, electric. R A Baldwin.
Railway tie and chair, combined. J A Yast.
Railway track joint. W M Hervey.
Railway tracks, device for placing topedoes on rails of. E W Griffin and C Seiler.
Railway trains, apparatus for controlling gas supply on. E F Howlden.
Reaper reel rake W Butterfield.
Reeds for weaving, &c.; manufacturing. J Reixach and H Emmott.
Reel. K E Daly.
Rein protector. E W Craine.
Ribbon holder. J S Lyons.
Roasting furnace. H A Keller, W G Cole, and J E Gaylord.
Rolling mills, roll for chain or bar. O Klatte.
Rope or cable coupling. R Lee.
Safety pin. E Lewis.
Sash fastener. J E Hartmann.
Sash fastener. E S Winchester.
Sawmill. I W Hay.
Scaffold fasteuer. A Kuhn.
Screw clamp, hand. M F Larsh.
Seal L A Foote.
Seal, metallic. N A Vurgason.
Sewing machine quilting attachment. J M Stukes
Sewing machines, channel guide for shoe. M L Keith
Shade holder. E Blackman.
Shaft hanger, counter. D J C Arnold.
Sharpening razors, &c., apparatus for. J W C Kleeberg.
Sheet metal flanging machine. W Westlake.
Sheet metal milling or corrugating machine W Westlake.
Sheeting roll, non adhesive. J H Mitchell.
Shingle planing machine. W J Pugh.
Signal mechanism. S H Stupakoff.
Skid, barrel. H E Williams.
Snow melting composition. J W Hallman.
Soap shaver. L Malzacher.
Soda, apparatus for manufactring caustic. T Craney.
Solder machine, wire. F W Schultz.
Spinning, apparatus for facilitating doffing bobbins in. P Clough.
Spool cabinet. E H Northcutt.
Square, folding. A G McDonald.
Stay, dress. H D Stone.
Steam boiler, section. G Fillion.
Steam trap. A F Nagle.
Steam trap. J Poulson.
Steamer, wheat. F M Caine.
Stocking supporting clast. C F Roper.
Stone drag. A W Ballou.
Stove lid A Dillenbeck and W S Clute.
Stove, vapor or gas. H H Kelley.
Straw burner. F Girtanner.
Strong box. S L Saunders.
Sunshade, portable. G D Ackermann and M Frohlich.
Telegraphing machine, automatic. C E Yetman
Telephone and telegraph system, combined. C A Shea.
Telephone metallic circuit 2. C A Shea.
Telephonic and telegraphic system, combined. C A Shea.
Thill coupling. G A Fowler.
Thill coupling. D B McCapes.
Tickler, office. F A Herrick.
Time alarm, electrical. W Wilke.
Tires, valve for pneumatic. G H Tansley.
Tobacco casing and flavoring machine. J H Kester.
Tobacco leaves, machine for treating 2. J W Fries.
Tobacco plants, treating. S T Cole, R B Austin, and P L Brizendine.
Toilet flask. W A Bradbrook.
Toy swing. C H Brooks.
Transfer case and bill file, combined. T F McGarry.
Truck. H Lind.
Trucks, antifriction device for car. M G Hubbard.
Tube bending machine. J E Richard.
Type writer's finger protector. C H English.
Type writing machine 2. J W Morris.
Type writing machine. J W Schneckers.
Valve 2. J H Grubb and R H Binns.
Valve. J H Pierce.
Valve for operating automatic brakes. B J Rowell and G A Ayer.
Valve, pressure reducing. E P Holly.
Valve, straightway. J H Laymau.
Valve, straightway 2. J Powell.
Vapor burner. I Culver.
Vapor burner H S Giles.
Vehicle. S Mills.
Vehicle. C H Stratton.
Vehicle spring. C A Behlen.
Vehicle wheel. G Lanbe.
Velocipede treadle. A B Curtis.
Vending machine, coin controlled. C A Shattuck.
Voting machine. A O Abbot.
Wagon. H Just.
Wagon or vehicle, tower. J R McCardell C H West and M J McDonald.
Washing machine. E B Anderson and O Hammarstrom.
Watch bow fastener. E J Swedlund.
Watchmaker's tool. W C Seytridt.
Water closet seat attachment. J H Stevens, Jr.
Water column. J G Poage.
Waterproofing and preserving brick walls, &c., composition for. R D Gates.
Windmill. F A Mathews.
Window. L H Mullikin.
Window guard. M D Wiedinger.
Wire stretcher and connector E M Cosner.
Wire stretcher and staple puller. C T Howard.
Woodworking machine, chip breaker for. C D Marsh and C F Overhiser.
Wrench. J S Copeland.
Wrench. E Hansen.
Wrench. A L Rose.
Yoke center, neck. N F Harris.

PATENTS GRANTED FEB. 19, '95.

Air blowing machine. A S Reed.
Air compressor, hydraulic. R N Lowe and F C Guyser.
Air cooling apparatus. J R Cook.
Alarm gage testing mechanism. W H Bradt.
Axle box. W Hyde.
Bait, artificial. J T Hastings.
Baling press 2. P C Southwick.
Bed and crib, folding. D Froehlich.
Bed and sofa, combined. J Jankowski.
Bed bottom. P B Rooney.
Bed bottom, spring. P U Miller and M T Zuck.
Bed, folding. M Wisel.
Bed, spring. G Mafera.
Beer rack. F A Loeble.
Bell, electric. W A Harvey.
Belt. W B Fosdick.
Belt tightener and shifter combined. P H Quinn.
Bicycle. E D Williams.
Bicycle saddle. A L Garford.
Blacking case and chair, combined. L Manguine.
Blasting. H J Smith.
Bleaching. J Clapham, J Picard, C Villedieu and W W L Lishman.
Boiler cleaning compound. M L Hill.
Boiler or other furnace. G A Newton.
Bolt. J Hodgson.
Book lock, permutation. L Haberer.
Boot or shoe. W H Young.
Box form wrapper. F W Wilcox.
Box nailing machine. J H Swift.
Box or crate machine. L J Dupree.
Brake wheel. J Timms.
Brick, building. G S Balsley.
Brick machine. E Fernholtz. (Reissue)
Broiler, coffee roaster, and waffle iron, combined. C E Fleming.
Brush, electric. A L Sonn.
Brush, electrical. A L Sonn.
Bubble blower, soap. J H Montgomery and J H Hammond.
Buckle. E Smith.
Bung or tapping device. C McDougall.
Burglar alarm E Reichenbach.
Burner for crude oils and steam. J F Miller.
Button, collar. G H Williams.
Button, track fastened. A J Shipley.
Buttons, fastening for link cuff. S Goidner.
Calking joints of pipes and mains, apparatus for. D O'Neil.
Cane weaving, crossing needle for. E Morris.
Cans, siphon pump attachment for oil. E R Franklin.
Car coupling. L T Backus.
Car coupling. W L Hoffecker.
Car coupling. J R Magee.
Car coupling. W E Seeley, Jr., and W L Hoffecker.
Car fender. R F Preusser.
Car fender, street. R L Burleson.
Car, freight. J E Simons.
Car guard. C P Stimpson.
Car step. E S Stevens.
Car, stock. W S Johnson.
Cars, electrical alarm for street. G F Atwood, J W Aylsworth, and W H Miller.
Carding machine. F J Manborgne.
Carding machine feeding mechanism. E V Bates.
Celluloid, etc., method of and apparatus for treatment of. H E Miller.
Chain link bending machine. J Stubbe.
Chair tablet arm. C B Demarest.
Check protector. W H Pitt and G Sittmann.
Checkrein loop. H H Baker, Jr.
Check row wire reel. G D Haworth.
Checking and unchecking device. J Arnott, Jr.
Chopping knife. S Norris.
Cigar or pipe tip. J S B Hartsock.
Circuit making and breaking device. S W Stratton.
Clock synchronizer, electric C M Crook.
Clocks, electric winding and synchronizing device for. C M Crook.
Clocks, eccetric winding mechanism for. C M Crook.
Clothes line operator and holder. E and C E Hecht.
Clothes pin. S T Johnson.
Clutch, friction. J M Dodge.
Cock or faucet S H Lunt.
Coffin. F Egerrand aad J M Freese.
Corn stubble cutter. H B Ivins and A G Dunphey.
Cream separator, centrifugal. C Hohnsbehn.
Cultivating land, steam engine for. T Cooper.
Cultivator. W T M Brunnemer.
Cultivator. R Franken.
Cultivator. M Weber.
Curbing, metallic. I L Landis.
Danger signal. O T Wood.
Dental disk holder. W F Wooster.
Dental engine, electrically operated. W E Wheeler.
Dental implements, electrical apparatus for operating. O A and A F Pieper.
Derailing switch. E Samuel.
Derailing switch and signal 2. E Samuel.
Distilling and aerating apparatus, water. J H Vinton.
Door check and closer, pneumatic. J S Shrawder.
Door lock. A Gredell and W F Paden.
Dowel setting machine. C Foster and H A Sippel.
Drier. W F Jobbins.
Dust collector. L O Stevens.
Dye, blue diazo. R Paganini.
Ear drum, artificial. A V Sanford.
Eaves trough hanger. S L Lewis.
Electric current distributing system. G B Pennock.
Electric light switch. H W Lawrence.
Electric line work, tower wagon for. J H Leonhardt.
Electric machine, magneto. H J Smith
Electrical alarm or bell. G F Atwood and J W Aylsworth.
Electrical conductor. G F Atwood and J W Aylsworth.
Elevator. L A Corron.
Elevator. T Tresl.
Elevators, automatic safety gate for. J T Hobbs.
End gate fastener. W Waiker.
Engine. P Z Davis and A M Barton.
Envelope. E S Vance.
Envelope threading machine. S P Denison.
Excavating machine. G W King.
Fabric piling machine. J B O'Bryan.
Fabrics, machine for inserting threads into woven 2. E Morris.
Fan, electric rotary and revolubic air circulating. S M Pierce
Faucet and attachment therefor. J E Wright and E A Grover.
Fence, portable. S B Duncan.
File, letter and bill. W O Gottwals.
Filing case L K Oppenheimer.
Filter. G Descamps.
Fire extingnisher. F Meyrose and J L Bradley.
Fireproof floor. F von Emberger.
Floor clamp. W G Wallace.
Fly frame. C Whitaker.
Fly paper, sticky. O Thum.
Fly screen. S R Deacon and R F Lotspeich.
Fodder cutting machine. D G Landes.
Folding chair. H Evers.
Fruit cleaning and polishing machine. J H Beamer.
Furnace roof. J E Bott.
Furniture brace. J E Summers.
Game apparatus. E H Hyde.
Garden rake. J North.
Gas engine. G J Weber.
Gas retort charging apparatus. G A Bronder.
Gate. A J Barnwell.
Generator E P Waggoner.
Glass, machine for manufacturing wire. J N Gregg and C C Stoufler.
Governor. F M Rites.
Grading and ditching apparatus. E P Fox.
Grain binder. M Kane.
Gramophone. E Berliner.
Grinding machine, cutlery bolster. A Johnston.
Gun, magazine. B F Pettit.
Hammock. R C Funke.
Harrow. H Wagner
Harrow tooth fastening. A F Molitor.
Harvester. P Barber.
Harvester, corn. C J Skeen.
Harvester knife grinder. G H Fowler.
Head rest. G F Sargent.
Hoisting machine power gearing. F Streckenbach
Hook and eye. C E Hallowell.
Hook and eye. A Prym.
Hoop fastener, barrel. J Leach.
Horse shield. L A Downs.
Hose leak stop or jacket. A G Parkhurst.
Indigo white, artificial. K Henmann.
Injector. J Trix and J Desmond.
Ironing board. G H Ashworth.
Joint lock, telescopic. C C Frost.
Key ring. J C Scharlbaum.
Kiln. C F Kaul.
Knife or fork handles, machine for grinding and polishing. A Johnston.
Knitting machine stopping device. C W Kutz.
Lace reel. C A Prechtel.
Ladder, extension step. A A Bowser.
Lamp. F Billingham.
Latch and lock, combined 2. N H Colwell.
Lath, sheathing. M C Nichols.
Lathe tool holder. L S Martin.
Lather cup. W N Lawrence.
Lawn sprinkler. J B Fellows.
Leak protector for vessels. M W Marsden.
Leather loops, machine for making. F J Bringham.
Level, spirit. J A Traut.
Life raft B H Meyer.
Lifter. F E Armstrong.
Lime kiln. M Sayre.
Liquors, production of alcoholic. O Lugo and H T Jackson.
Lock. J T Marlin.
Lock and latch, combined. U D Mihills.
Loom loose reed motion 2. W McMichael.
Loom temple. T Sykes.
Lubricator. M B Wible and H D Pressey.
Manicuring implement. J A Everett.
Mast or spar. W E Lewis.
Mast, spar, etc, for sailing vessels. W E Lewis.
Measure for drafting dress skirts. D L Brown.
Metal mixing device, molten 2. G N Sceets.
Mineral substances, separating apparatus for 2. I Christ.
Mining machine. C O Palmer.
Molding machine. P F Walstrom.
Molding machine post or side spring. S J McConnell.
Music leaf turner. E S Skelton.
Musical instrument. D Fitler.
Oils, purifying hydrocarbon. J J Suckert.
Ophthalmic instrument. B I Price.
Oven, baker's. E Schilg.
Oxidizing furnace. S L Priestone.
Oxygen and hydrogen by electrolysis, apparatus for production of. P Garnti.
Package, silk or thread. J P Fraley.
Packing. H C Platts and T Lowther.
Packing, piston rod. L H Clark.
Padlock, permutation. H Wagner.
Pail, pan, etc. T D Brown.
Paper bag machine. M F Connors.
Paper bag machine W A Lorenz and E E Claussen.
Pea shelling machine. G Dunckley.
Photographic shutter. F H Kelley.
Photographic shutter. F J Mathieu.
Pick and shovel, combination. T and J Cummings.
Pipe connection, steam heating. J Emerson.
Planing machine. J Rawle.
Planter drop mechanism, corn. J C Courtney.
Plastic materials, machine for molding articles from. H E Miller.
Plow, rotary. A Mechwart.
Polishing machine. A Johnston.
Post hole digger. J W Estes.
Potato digger. P F Wells.
Pottery, machine for forming, turning, and and shaping. C C Thompson.
Preserving fruit, etc. H A Hughes.
Printing machine. E H Cottrell.
Printing machine 2. W H R Toye.
Printing machine carrier device. W H R Toye.
Printing press. W H R Toye.
Printing press, web. W H R Toye.
Projectile. C J Stuart.
Projecting images into distant bodies, apparatus for. R A Scott.
Propeller. L Juliay Puig.
Pulley. B L Gale.
Pulley, self oiling. W H Fritz.
Pulley, speed. W M McIntyre.
Pump. P Dean.
Pump, air compressing. J H Moore.
Pump, self measuring. S F Bowser.
Pumping engine, caloric or hot air. U G Lee.
Pumping engine, steam. J McGrath.
Pyrotechnic compound. C Gerhard.
Railway, conduit electric. O Cohen.
Railway, conduit electric. A Rosenholz.
Railway, conduit electric. W Simon.
Railway signaling apparatus. W H Walsh.
Railway spike. F E Grau.
Railway switch. F B Kron.
Railway system, conduit electric. W L Hedenberg.
Railway tracks, automatic brush for. G J Smith.
Railways, electric bell system for street. E L Stansberry and J Bettinger.
Ramming seat. J K Gunn and T G Banford.
Reflector, arc lamp. C Coerper.
Regenerative furnace. F Siemens.
Register. R B Wardin.
Riveting machine. J I Smith.
Road making and repairing machine. O E Meats.
Rock drill. T J Murphy.
Rock drill tripod. T J Murphy.
Rod coupling. E M Hoagland.
Rolling pin. F E Wolff and G Finfrock.
Rope carrier, fall. S A Cooney.
Rowlock. L K Scudder.
Sack holder. I G Moon.
Sand drier. L C Atwood.
Sash fastener. W M Moore.
Saw bench gage. H L Weindel.
Saw filing machine. R Bauer.
Saw setting machine. R Bauer.
Saw setting machine. P Pryibil.
Scaffold, self standing. P P Massau.
Scale, computing. D J Smith, Jr.
Scale, price and weighing. D J Smith, Jr.
Scraper, self loading earth. E P Fox.
Scraper, wheeled dumping P Peevey and M G Bunnell
Seal lock 2. J Upshur.
Seed drill. G W Tucker.
Sewer trap. E E Krowl and J A Walker.
Shade fasteners, machine for making. A W Currier.
Sharpening machine, disk. C H Green.
Shearing tool for rods and bolts. J C Hogg.
Shelving. A B Wagner and E Liesenhoff.
Shirt waist. D Cologne and S H Nichols.
Shutter or blind, awning. A Schmitt.
Shuttle and shuttle actuating mechanism. W H Hanna.
Signaling apparatus, electric. J D Price.
Signaling system. W E Decrow.
Siphon or vessel for aerated liquids. S Davis.
Sirups, manufacture of. I A Shanton.
Slicing machine. I L Landis.
Smoke consumer. J T Ellis.
Smoke consuming furnace. G F Tinkham.
Snow guard. J T Breadner.
Spinning machine clearer. W C Pierce.
Spinning spindle, flexible. G Singleton.
Spinning spindle mounting. H D Klots.
Square, tailor's. J R Olsen.
Stacker, pneumatic. G Anderson.
Stacker, pneumatic. P Swenson.
Stage effect. E E Vance.
Stave sawing machine. T H Webster.
Steam or hot water conduit. A Harvey.
Steel, etc., treating. J E Bott and H Cramp.
Steering apparatus. R N Cyamberlain.
Steering apparatus and windlass. S Davidson, Jr.
Stocking and manufacturing same. J Bennor.
Stocking stretcher. W Dawson.
Stop motion mechanism for slubbing, intermediate and roving frames. W H Erskine.
Storage battery. G A Ford.
Straw stacker. F W Robinson.
Stump puller. F M Wilson.
Suspenders. E F Merwin.
Table and writing desk, combined. O J Carlson.
Table waiter, antomatic. J Burhen.
Target trap. B F Wright.
Telephone and signaling circuit. F A Pickernell.
Telephone circuit switch device. C Clamond.
Telephonic apparatus. N L Burchell.
Thrasher. T A Bryerley.
Thread guide and cutter. J Walter.
Tire. E E Horton.
Tire, pneumatic. C B Bowling.
Tire tightener. G W Demaree, H O Smith and J W Ditmars.
Tires, method of and apparatus for constructing pneumatic bicycle. A B Shaw.
Tobacco, machine for attaching metallic tags to plug. W B Munnell.
Toe weight. F P Hamlet.
Tonsilotome. G Ermold.
Tool, combination. J N Parker.
Tower. H W Gleason.
Toy windmill, double rotary. F Beaumont, Jr.
Tramway, aerial rope. S A Cooney.
Trolley, cableway. S A Cooney.
Trolley wire crossing. C S Hersh and E F Weaver.
Trolley wire support. M T Murphy.
Trolley wire support. M F Van Buren.
Trolley wire switch. F M Zimmerman.
Turning machine 2. Q W Booth.
Tuyere iron for forges. J Clark.
Type containing channel. L K Johnson.
Type setting and justifying machine. P F Cox.
Type writer clip. A J Gibson.
Type writing machine. C Spiro.
Upper banding machine. C B Hatfield.
Urn. T Miller.
Valve, balanced. A B Van Wegen.
Valve, fluid pressure signal. H R Mason.
Valve, safety. C J Mellin.
Valve, sliding. C G Collins and A C Hilsinger.
Vehicle bolster. C F Bettmann, Jr.
Vehicle brake shaft hanger. M Potter.
Vehicle seat. T C Shankland.
Vehicles, ball traction and tread for. J B Linn.
Velocipede, ice. P J Parsons and A N Jones.
Ventilator. J T Darkins.
Vise, plumber's. G F Nilsson.
Water and sand elevator. E P Davis.
Water heating apparatus. J S Coe.
Water or gas pipe. D J Macpherson.
Water wheels, discharge gate for turbine. M A Repolgle.
Window. F von Heydebrand und der Lasa.
Window appliance. E Keuser.
Wire cloth reel, cutter, and measurer. O P Schriver.
Wire stretcher. W H Dungan.
Wool, extracting fat from. E Fahrig.
Wrapping machine. F E Redington and C U Trowbridge.
Wrench. T M Simcoe.
Yarns, skeining. R Smith.
Yeast cakes, machine for making. F H Marker.

AUSTRALIA.

Fortunes are still often realized by Patenting American Inventions in that rich series of countries forming the Australian Colonies, viz., Victoria, New South Wales, South Australia, Western Australia, Queensland, New Zealand and Tasmania.

George G. Turri, Registered Patent Agent, of Melbourne who is known throughout the world as a Leader in his Profession, and has during the last 9 years obtained an unusually large number of Patents for American inventors and Patent Attorneys, may now be employed on lower terms than have ever yet been quoted. The rates have certainly never been tempting until now.

George G. Turri places approved patents (no others) effectively before Australian capitalists, with whom he is in touch, and has negotiated many highly important and profitable sales on a purely commission basis.

As delay is often Fatal to Validity, send immediate instructions naming Colonies where patent is required, and enclose one copy of full specifications and drawings to GEORGE G. TURRI, Sun Building, Queen and Bourke Streets, Melbourne, Australia. Send also $60 per Colony. See full particulars and obtain blanks (free) at INVENTIVE AGE Office, Washington. Special rates to profession. Correspondence invited.

T. H. ALEXANDER. *Attorney and Counsellor at Law.*

ESTABLISHED 1857.

ARTHUR E. DOWELL, *Att'y at Law, Mechanical Expert.*

ALEXANDER & DOWELL,

SOLICITORS OF PATENTS.

Rooms: 1, 2 and 3, Marble Building, 607 7th St., N. W., Washington, D. C.

Send for our Book on Patents.

MECHANICS;

Mechanical Drawing; Electricity; Architecture; Architectural Drawing and Designing; Masonry; Carpentry and Joinery; Ornamental and Structural Iron Work; Steam Engineering Stationary, Locomotive or Marine) Railroad Engineering; Bridge Engineering; Municipal Engineering; Plumbing and Heating; Coal and Metal Mining; Prospective, and the English Branches. Students make rapid progress in learning to Draw and Letter. Send for Free Circular, stating the subject you wish to study. to

THE INTERNATIONAL CORRESPONDENCE SCHOOLS, Scranton, Pa.

McLaughlin & Fitzsimmons,

Popular Price Tailors,

434 9th St. N. W.

OUR MOTTOES:

Superior Quality,
High Class Workmanship.
Perfect Fits.

J. SCHULTZBACH,

Mechanician and Model Maker,

Models for Patents and Experiments.

Electrical and Meteorological Instruments and light machinery of every description made to order.

713 6th St., N. W., WASHINGTON, D. C.

WOOD COAL COKE

Dry well-seasoned Wood.
Free-Burning Coke.
First Grade Coal.

Sole Agent for the

Celebrated ARGYLE STEAMING COAL.

THOS. R. MARTIN,

MAIN OFFICE: 920 20th St. N. W.,
WASHINGTON, D. C Telephone 1766

THE

Railroad Car Journal

IS THE ONLY

publication in the world devoted exclusively to the construction, maintenance and interchange of Railroad Car Equipment. A Journal for Superintendent of Car Department, Foreman, Inspector and Repairer; and especially for inventors of car appliances. Subscription ONE DOLLAR per year. Sample Copy Gratis.

617 Vanderbilt Building, NEW YORK.

$1.98 ═══ $2.48

Any ladies' shoe in the house

One Dollar and Ninety-eight cts.

The pick of men's shoes for

Two Dollars and Forty-eight cts.

Stoll's Shoe Palace,

810 7th St., N. W.

ESTABLISHED 1857.

W. W. KIMBALL CO.

MANUFACTURERS OF

PIANOS AND ORGANS,

Highest Honors World's Fair.

60 Organs Daily. CHICAGO. 20 Pianos Daily

OFFICE AND WAREROOMS:
Wabash Avenue near Jackson Street.
FACTORIES: Corner 26 and Rockwell Streets.

D. BALLAUF,

Practical Mechanician,

(Established 1855.)

Constructor of Light Machinery, Experimenta and Model Work.

All orders for Certified Duplicates of Patent Office Models, and Models of any Foreign Patents from Drawings and Specifications, filed in the Library of the Patent Office for law suits in case of infringement; also, Original Models for Inventors, and Models to complete application for Patents, from Drawings and Specifications filed in the Patent Office.

731 7th Street, N. W., WASHINGTON, D. C.

One of the most interesting and useful books for inventors published. Elegantly bound. Price 50 cents.

☞The above book and the INVENTIVE AGE one year, $1.35. Address

THE INVENTIVE AGE,
Washington, D. C.

And What Do You Think of This?

JUST OUT! BRAND NEW! ENTIRELY ORIGINAL!

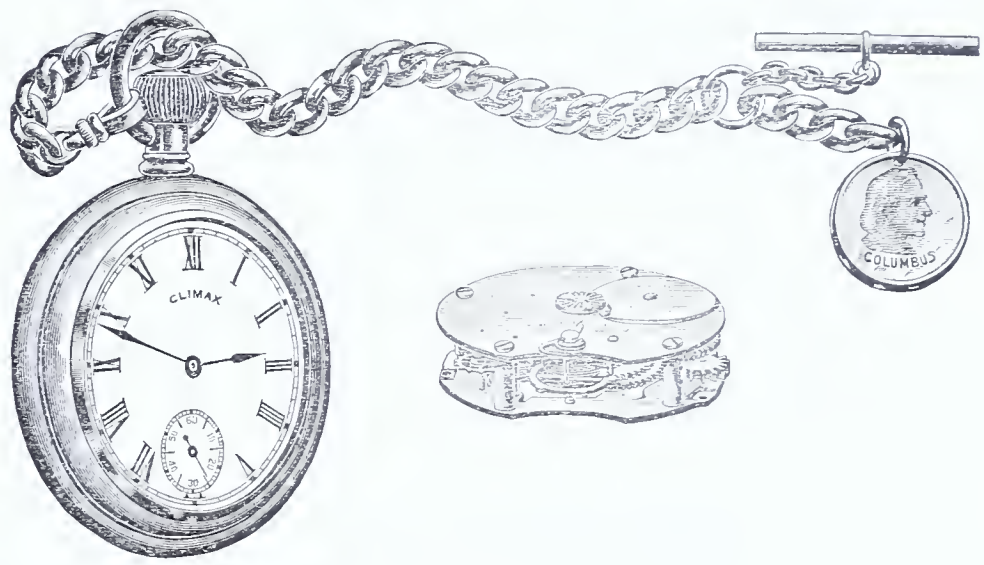
$2.

An American Stem-Winder.

A DUPLICATE IN QUALITY, APPEARANCE SIZE, ETC., OF ANY AMERICAN WATCH SOLD FOR LESS THAN $10.00

Our Watches are Positively and Unequivocally Guaranteed.

THE CLIMAX



EITHER ARABIC OR ROMAN DIAL.

This is the CLIMAX up to date. It represents the most important step taken in Watch evolution in many years. It describes a line beyond which nothing radical will pass for years, not only in the matter of PRICE, but QUALITY. The movement comprises many original patented features, and has been for years the subject of constant labor by one of the foremost of the foremost of expert and inventors.

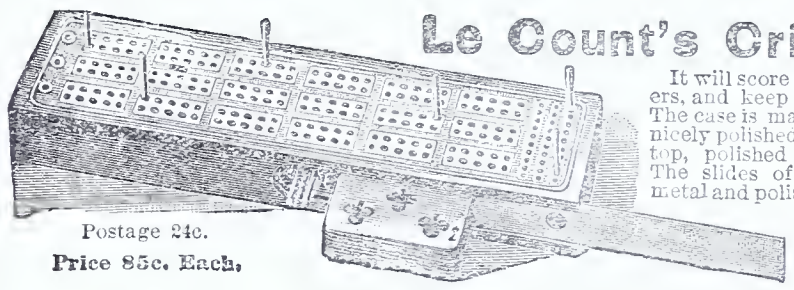
DESCRIPTION.

CASES.—Two Styles, Plain and Imitation Engraved. Two Finishes, Solid Gilt and Nickel. Two Dials, Roman and Arabic. Snap Back. Heavy Bevel Crystal. Regular Stem Wind. Inside Stem Set. Regular 18 size Case. Chains assorted in each dozen.

MOVEMENT.—Regular American Lever, Lantern Pinion, Quick Train, 240 Beats per Minute Three-quarter Plate, Short Wind, Runs 30 hours to one winding. Dust Cap over Movement. Fully Timed and Regulated, and FULLY GUARANTEED for one year, the same as Waltham or Elgin.

The Cheapest Stem-Winding Watch Ever Produced.

PRICE $2. With "THE INVENTIVE AGE" one year, $2.50.

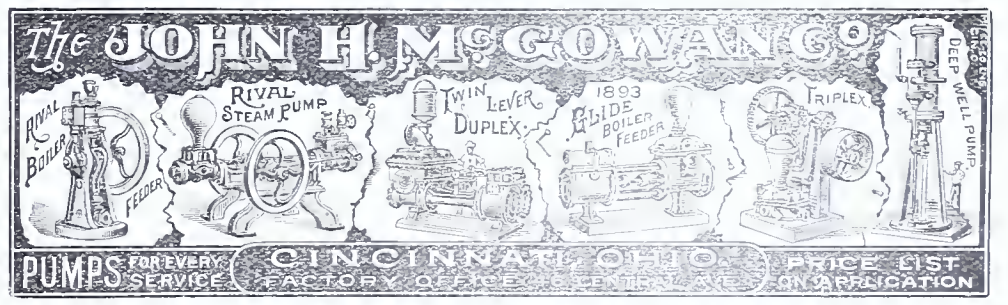


Le Count's Cribbage.

It will score for three or six players, and keep tally of the games. The case is made of black walnut, nicely polished; has a solid metal top, polished and nickel plated. The slides of compartments are metal and polished. This Board is superior to Boards that sell for three times the price. Full directions with each Board.

Postage 24c.
Price 85c. Each.

With "Inventive Age" one year, $1.60.



The Advertisers, Subscribers and Readers

Of the Inventive Age will secure neatness, dispatch and moderate prices on all kinds of printing by calling on

The Age Printing Company,

Corner 8th and H Streets, N. W.

Call us up by Telephone, 1516, and our representative will visit you, give estimates and take orders. . . .

The Inventive Age
AND INDUSTRIAL REVIEW
A JOURNAL OF MANUFACTURING INDUSTRY AND SCIENTIFIC PROGRESS

Sixth Year. No. 4. | WASHINGTON, D. C., APRIL, 1895. | Single Copies 10 Cents. $1 Per Year.

A DISABLED WAR SHIP.

Inventive Genius as Applied to the Torpedo, Illustrated in the China-Japan Conflict.

Nearly every one is conversant with the causes of the great war in the Orient and how constant agressions on the part of the Chinese at last provoked the little island of Japan to begin hostilities. It is admitted that the Japanese had good cause for this from their standpoint. According to a solemn treaty made at Tien-tsin the Chinese were to keep their hands off from Corea and the little peninsular kingdom was to be guaranteed her independence, but China very soon found a pretext to send a few soldiers to Seoul and in spite of the protests of Japan that this was in violation of the treaty, they continued to press troops of slant-eyed Mongolians into the troubled capital. It is said that the Corean king was alarmed, fearing the giant power of the Celestials and complained to the Japanese, but, although another protest followed, coupled with a threat to station a force of Japanese soldiers at Seoul, the Chinese government continued to introduce regiments to the King of Corea on the plea of putting down a rebellion there. Finally the Japanese, who had expected this indifference, sent a large and influential delegation of armed and uniformed men to Seoul and straightway the Corean monarch found himself guarded and protected too much, and, in their turn, the Chinese protested. War was soon declared. The Japanese, like the Germans in the Franco-Prussian war of 1870, were the better prepared for the conflict, and victory after victory followed their advance into Manchuria and their iron-clads overcame the Chinese everywhere. It was discipline and experience against raw recruits. The Japanese nation had foreseen this appeal to arms and had been making preparations for over a year. Their navy was equal to that of China. It was better drilled and officered. Their torpedo service was larger and it proved a powerful adjunct. It was a triumph of skill over brute force, and officers from the navies of other countries in Europe were interested spectators, detailed to watch the engagements. Those on the water have been charaterized by great ingenuity and skillful maneuvering on the part of the Japanese. Their iron-clads have not been better constructed, but they have been better manned and officered. Their markmanship has been more accurate.

CHINESE MAN-OF-WAR "YAN WAI" DESTROYED BY JAPANESE TORPEDO, IN GREAT NAVAL BATTLE IN YELLOW SEA.

黄海海戦後我軍艦の水雷に撃破せられたる清艦威揚の眞景

The illustration presented herewith shows one of the Chinese battle ships after having been destroyed by a torpedo and is made from an actual photograph of the sunken monster. It shows that however well protected these war vessels are in the matter of armor, they are powerless against the subtle approach of the torpedo, unless their guns are manned by experienced cannoneers capable of blowing out of water the smallest craft. It is an impressive spectacle that of a wreck like this—a mass of iron and wood—a hopeless, helpless ruin, involving the loss of hundreds of human lives and millions of money.

The invention of the successful torpedo is still a matter of the future, and when dynamite and torpedo tubes can safely be launched so as to strike the bottom of a war vessel, all the steel armor in the world, whether Harveyized or not, will be impotent to prevent disaster.

In the China-Japan war the projectiles thrown against the battle ships in most cases did little damage, but in the case of the great Chinese vessel the Chin-Yuen, shells from the Japanese fleet succeeded in completely disabling her. There were experts from European nations acting in an advisory capacity on board the war vessels of Japan and China, and some of the vessels were commanded by foreign officers, but it has been the opinion of impartial observers that the Japanese officers themselves showed a knowledge of the art of war that was entirely unexpected by Europeans and the unvarying round of successes that has humbled her powerful neighbor has astonished the civilized world. Neither the Japanese nor Chinese exhibit great inventive genius, but they are marvelous imitators and their skill in copying our machines and processes of manufacture, added to the trifling cost of labor and subsistence, is slowly threatening to became a serious menace to the manufacturing interests of this country and Great Britain. Many useful industries have recently been introduced into Japan and the cost of production so cheapened that domestic goods, such as jute rugs and straw matting, can be made by them and shipped to this country to be sold at a less price than they can be made here.

The Inventive Age

Established 1889.

INVENTIVE AGE PUBLISHING CO.,

8th and H Sts., Washington, D. C.

ALEX. S. CAPEHART. MARSHALL H. JEWELL.

The INVENTIVE AGE is sent, postage prepaid, to any address in the United States, Canada or Mexico for $1 a year; to any other country, postage prepaid, $1.50. All subscriptions stopped at expiration of term.

Correspondence with inventors, mechanics, manufacturers, scientists and others is invited. The columns of this journal are open for the discussion of such subjects as are of general interest to its readers.

Technical matter is particularly desired. We want practical information from practical men.

Nothing will be published in the editorial columns for pay.

The INVENTIVE AGE is thoroughly independent.

Advertising rates made known on application. Special facilities for furnishing cuts of any patented article together with descriptive article. Business specials 25 cents a line each insertion, 7 words to the line. No advertisement less than 50 cents.

Address all communications to THE INVENTIVE AGE, Washington, D. C.

Entered at the Postoffice in Washington as second-class matter.

WASHINGTON, D. C., APRIL, 1895.

ELECTRICITY is now being used in place of the surgeon's saw and knife to check the progress of gangrene.

THE sympathy shown when Tesla's laboratory was burned and the expressions of regret for his loss shows the public estimate of the worth to the world of an original and successful inventor.

ACCORDING to the Glasgow newspapers two young Scottish workmen have invented a battery which, it is claimed will revolutionize electrical work. Lord Kelvin a leading man of science offered to purchase the patent for $50,000.

WORK is favorably progressing on the electric road between Washington and Baltimore. It is to be double track. The trains to be operated at a speed of from forty to sixty miles an hour. When completed the price will be reduced from $2 to $1 for the round trip.

THE flying machine is still one of the prospective successes of the opening of the twentieth century. Prof. Langley's aluminum engine has achieved a flight of about one thousand feet and although only an experimental model, the recent experiments with it are considered more successful than those of Mr. Maxim in England.

THERE is to be an exhibit of machines and contrivances, invented exclusively by southern people, at Houston, Texas, next May, when the reunion of Confederate veterans takes place. This is a novel idea and the result of the experiment will be looked for with interest. There is, however, no reason why inventive genius should be sectional in its development.

A NEW material for conducting sound has been utilized by a Pittsburg firm, which advertises a telephone fitted with a receiver capable of transmitting speech perfectly with the operator eight or ten feet away from the 'phone. The diaphragm is made of aluminum and is exceedingly sensitive. This arrangement will enable operators to use the instrument without leaving their desks and will be a stride in advance of the present method.

A Texas legislator by the name of Seabury has introduced a bill in the house of representives of that state that provides that any person in the state, who receives a letter from any one, and fails to answer in ten days, shall be subject to a fine of $1,000, or a year in the county jail, and in aggravated cases, both penalties shall be enforced. It is presumed that when one sends a bill and the debtor does not pay any attention to it, that will be considered an aggravated case.

IN regard to the movement on foot among inventors to remove the objectionable provision in the U. S. Patent Laws, which causes an American patent to live only during the term of a foreign patent for the same invention, Prof. Elihu Thomson goes on record as favorable to it and brings forward his reasons. He thinks that the statute causes credit to be given to other nationalities than our's for valuable discoveries because publication has been withheld in this country, and it is calculated to hurt the nationol pride in our own achievments in the scientific world.

WHY are there so many broken banks? Why are there so many wrecked Trust Companies? Why are there so many railroads in the hands of receivers? Why are there so many worthless syndicates and land companies? In short, why do so many business enterprises throughout the country fail of success? The answer is a simple one—careless neglectful and indifferent management. A bank is established. A half a dozen prominent men are put on the board of directors, these men elect officers to run the institution, and then they let the institution run itself. The Directors meet once a week or once a month and listen to the report of the officers, approve of it and adjourn. Not one bank in five has its business thoroughly examined by competent members of the directory, and yet they know that hundreds of thousands of dollars are deposited in their bank for safe keeping by the citizens of the community in which they live, and they know that this money is always in danger unless watched with a vigilance untiring and unceasing. After years of this neglectful administration there suddenly comes a crash and the good men of the directory are amazed and astonished at the condition of the bank for which they have acted practically as guardians. Bank cashiers have embezzled funds for years which could have been detected at the very beginning of the crime if the directors had been watchful. Often one or two directors join the cashier in speculative transactions and wreck a bank, while the other directors sit passively by and dream that their institution is solid and properly managed. One half of the railroads which go into the hands of receivers in the United States every year, meet their fate because the directors have neglected their duties, and failed to compel a practical economy in the administration of the road. Hundreds of land companies all over the country have been wrecked by the stupid and criminal management of one or two officers who could and ought to have been controlled in their actions by the united care and wisdom of the board of directors, but who lent their eminent names to the enterprises and then let the enterprises take care of themselves. This indifference, this criminal neglect has in almost every instance been the prime cause of these misfortunes whereby thousands of investors have lost money and experienced great hardship. The time will come when a man lends his name to an enterprise, that public opinion will hold him responsible for its proper business conduct. If he lends his name he must give his time and his best energies to its success, because the confidence people have in him has led them to invest their money in that enterprise which he represents as director. There are thousands of business men today in the United States, each of whom is connected with from ten to thirty enterprises as directors and any one with common sense must know that it would require sixty hours a day and ten days in every week for them to attend the various directory meetings and discharge the important duties connected with their numerous trusts. Business men are trying to do too much in this respect and consequently can only half do their work, and they do that half only indifferently well. Public opinion will soon be so aroused with indignation at this condition of things that business men, who have a spirit of self respect and honor, will not permit their names to be used in any enterprise unless they are determined to give their best energies to its success. When this condition of things is reached, wrecked banks, ruined railroads, paralyzed land companies, shaky factories and shabby enterprises of all kinds will grow less and less and then there will be a healthier tone to all business affairs, and a stronger confidence in mankind.

NOTES.

Large Order for Aluminum.—The French Government have given a single order for 92,000 pounds of aluminum to be used for the construction of steam launches for the navy; the only company in Europe which can fill this order without great delay is the one at Neuhausen.

* * *

A New Steam Carriage.—An extraordinary horseless carriage, which is not electric, but propelled by steam, is an innovation in France. A coachman sits in front before a pair of upright handles not unlike those of a bicycle, with which he steers. The first cost of these carriages is about $100, but the kerosene wick is a cheap horse, and costs nothing to keep and little to make go.

* * *

Use of Petroleum In St. Petersburg, Russia.—For domestic heating purposes, petroleum is not used in Russia at all, the predominant fuel in the largest portion of the Empire being wood, supplemented with coal. For cooking purposes, kerosene is used only on a very limited scale and in exceptional cases, much less so, on the whole, than in the United States. The ordinary American keresone stoves have been largely imitated in Germany and introduced into the Russian market. They are of various sizes and sell as low as 6 rubles (about $3) apiece.

* * *

An Automatic Brake.—English railway engineers believe that they have attained an ideal solution of the automatic brake question, which has so long harrassed American managers, who are by law obliged to equip all trains with such brakes. There is now being submitted to exhaustive practical tests in England an automatic continuous power brake invented by Roberts, for which the greatest claims are put forth. The weight of the car body supplies the power to actuate the brake, and so the force is adjusted to the weight of the train. A detailed description and plans of the mechanism have been furnished by United States Consul Claude Meeker, at Bradford, Eng.

Electricity Made by Wind.

The use of water power to manufacture electricity long ago suggested the employment of windmills for a similar purpose. It was soon discovered, however, that while the wind current is strong enough to run a dynamo, it is not constant and cannot be depended upon. Only by means of a storage battery can the wind be utilized to develop an electric current to good purpose. But by this arrangement and by running the dynamo at intervals, sufficient electricity can be generated and kept on hand to light a dwelling in the country or a number of buildings close together.

The experiment has been tried successfully at Marblehead, Mass., where a country residence, stable and workshop are supplied with light at less expense than the work could be done by steam. The plant cost $1,000, and the light costs one cent an hour for each lamp. This, of course, is expensive lighting, but perfection of appliances and multiplication of lights by taking in three or four adjoining houses, would materially decrease the relative cost.

The main thing is the utility of the windmill in the generation of electricity has been demonstrated, and the application of the principle may be endless.

The Laws Governing Ethereal Mediums.

The bequest of $115,000 which the late Robert Stanton Avery has left in his will to the Smithsonian Institution for "lectures and treatises upon and concerning those mechanical laws which govern ethereal mediums" might appear at first blush to be the testamentary whim of a very ethereal personage. The value of this scientific legacy, however, says the Philadelphia Record, may prove incalculable from the standpoint of America's position in the world of science. The mystery of ether—that unknown, hypothetical medium for all the waves of heat, light, sound, magnetism and electricity—lies at the bottom of the secret of nature, and the Avery endowment may yet be the ineentive to original research which shall take mankind a step nearer to the sources of world energy and force of transmission.

The magnetograph at Paris is reported to have recorded the recent earthquake at Constantinople 12 minutes after the shock, the distance covered being 3,000 kilometers, or about 1,800 miles. The oscillation must, therefore, have traversed Europe from east to west, at the rate of 150 miles per minute.

Lubricators.

Increase in speed of all rotating machines during recent years has added many problems for the mechanical engineer to solve, and one of the most important, if not the most important, is involved in the problem of lubrication. To determine what lubricant is best for a certain case is no trifling matter, and along with it goes the question how best to apply it so as to secure the best results with the greatest economy. Of automatic devices in use, designed for liquid lubricators, those of the sight feed type are probably, at present, most numerous, but among those which have been devised and proposed, the syphon type is probably most generally used. In lubricators of this type the syphon is generally a strip of fibrous material hanging over the edge of the oil cup with one end immersed in the oil, and the other depending to a lower level, delivers the oil drop by drop with great regularity.

Lubricators of the sight feed and syphon types have their places of special adaption of course, but undoubtedly they are employed in many places where the adaption is not marked and where lubricators of another type would be more serviceable. All sight feed and syphon feed lubricators are necessarily placed above the surface to be lubricated, because the oil must flow to said surface by gravity. The quantity fed must also be graduated with nicety, because the provision for storing any surplus is necessarily limited, and usually consists of a grease or oil basin somewhere under the bearing. These receptacles are themselves nuisances and require a large amount of attention. The oil once used with sight or syphon lubricators, can only be re-used after being filtered or otherwise purified of the silt which it has brought away from the bearings.

In addition to the syphon and sight lubricators, there are what are known as ring and chain oilers, consisting of either a ring or endless chain hanging on the shaft and depending into an oil basin below. This ring or chain is expected to rotate with the shaft and mechanically carry oil from the reservoir to its point of contact with the shaft. This style of oiler has received a certain amount of favor and at present may be regarded as a "fad" in some quarters but it has three important defects: First, The tractive force which causes it to move, is exceedingly slight, and is less for the ring than for the chain, hence a little obstruction like friction against the side of its channel is liable to arrest the oiler and thereafter no lubrication takes place. Second, It tends to keep the oil and sediment continually stirred up, and it therefore returns more or less worn out oil and silt to the bearing. Third, When the speed is not very moderate, the oil is thrown off by centrifugal force, against the side of the cap and box, whence it drips back to the reservoir without reaching the shaft at all. These are substantial and serious objections to all types of lubricators which feed from above, downward. No such objections rest against the capillary lubricators which feed from below, upward, because they stand in the oil reservoir and take up the oil by that mysterious force which we know by the term capillary attraction. Being below the shaft or surface to be lubricated, it is possible to provide in the bottom of the box for a large oil storage so that renewal need not be frequent. The unspent oil returns to the storage and may be used over and over again without filtering or trouble, because whatever silt it contains when it returns from the bearings will quietly settle as mud in the bottom of the oil chamber, and the fresh and unspent oil alone will ascend the lubricator for re-use.

Among capillary lubricators the majority have employed some fibrous material as a ladder for the climbing of the oil. Various other materials have been employed also, but always with same defect which attends capillary lubricators as they have been heretofore used, i. e. exposure of a large surface of oil to oxidation by the atmosphere. The oxidized oil not only loses its value as a lubricant but it clogs and impairs the capillary capacity of the vehicle. Therefore all capillary lubricators composed of fibrous material, or metal, prove less efficient after a while than at first. These objections have finally been overcome by a lubricator recently introduced by Dodge Manufacturing Company. Its primary feature is a collection of closed tubes, the lower ends of which are immersed in the oil and the upper ends in contact with moving surface to be lubricated. These tubes are in the form of slits, half or three fourths of an inch in one direction and so narrow in the other direction that the walls are within capillary distance of each other. These tubes will therefore fill themselves with oil, *drawn from below* the surface of the oil in the reservoir, and therefore free from the oxidized oil on *the surface* of the oil in the reservoir. All other capillary lubricators take up the surface oil and therefore increase whatever objection may exist because of the use of thick oil. The tubes being full of oil do not present any surface to the air, and do not permit oxidation of the oil in transit from the reservoir to the bearing surface. This lubricator therefore has two points of excellence not present in any other capillary lubricator with which we are acquainted, i. e. It takes oil from below the surface and therefore unoxidized. It carries the

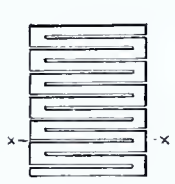


Fig. 1.

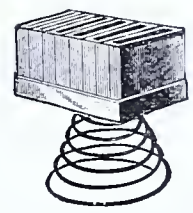


Fig. 3.

Fig. 2.

oil in closed tubes without exposure to the air in transit and therefore delivers only pure oil to the wearing surface.

This lubricator is as notable for cheapness as for efficiency. It is made from a small block of hard maple or other suitable wood. This block is nearly severed by thin saw kerfs, Fig. 1, penetrating from

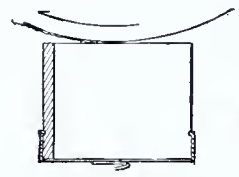


Fig. 4.

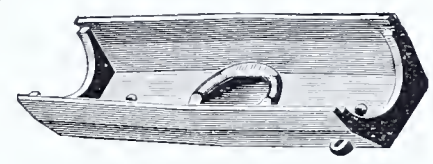


Fig. 5.

opposite sides alternately. The blocks are then pressed together until said saw kerfs are closed on their entering sides, Fig. 2, and the block then presents a set of thin tubes, triangular in cross sections. A binding strip of brass encircles the block to keep it closed together and a conical spring is fastened to it below, Fig. 3, to keep the upper end of the block always in contact with the moving wearing surface, Fig. 4. The top of the lubricator block

Fig. 6.

makes contact with the center of the shaft only, and therefore the oil taken up from the capillary slits will not be wiped off by the edge of the block

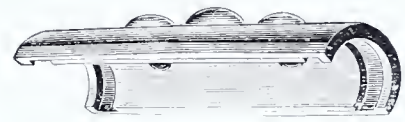


Fig. 7.

but will be carried up to the wearing surfaces. Fig. 5, 6, 7 represent the parts of the bearing box.

These lubricators have acted efficiently in experimental test without renewal of the oil for four months, and there is every reason to believe that they would continue to so act until the oil is entirely worn out and spent.

Right of Property in Invention.

The right of property which an inventor has in his invention, is excelled, in point of dignity, by no other property right whatever. It is equalled, in point of dignity, only by the rights which authors have in their copyrighted books. The inventor is not the pampered favorite or beneficiary of the government, or of the nation. The benefits which he confers, are greater than those which he recieves. He does not cringe at the feet of power, nor secure from authority an unbought privilege. He walks everywhere erect, and scatters abroad the knowledge which he created. He confers upon mankind a new means of lessening toil, or of increasing comfort; and what he gives cannot be destroyed by use, nor lost by misfortune. It is henceforth an indestructible heritage of posterity. On the other hand, he receives from the government, nothing which costs the government or the people a dollar or a sacrifice. He receives nothing but a contract, which provides that for a limited time he may exclusively enjoy his own. Compared with those who acquire property by devise or inheritance; compared with those who acquire property by gift or marriage; compared with those who acquire property by profits on sales, or by interest on money; the man who acquires property in inventions, by creating things unknown before, occupies a position of superior dignity. Even the man who creates value by manual labor, though he rises in dignity above the heir, the donee, the merchant and the money lender, falls in dignity below the author and the inventor. The inventor of the reaper is entitled to greater honor than his farther who used the grain cradle; and the inventor of the grain cradle is entitled to greater honor than his ancestors, who, for a hundred generations, had used the sickle. Side by side stand the inventor and the author. Their labor is the most dignified and the most honorable of all labor; and the resulting property is most perfectly theirs.—*Walker on Patents.*

Scientific Notes.

Much of the rich sculpturing in the new Congressional Library Building is being done by the use of a new invention in the shape of an air chisel. By the use of this marvelous little machine the modern statue is carved quickly and with a precision almost equal to the old masters. Of course a model in plaster is necessary, the compressed air chisel being used simply for re-production. The tool is not unlike the dentist's drill. It runs under about thirty pounds pressure and strikes a blow between 1,200 and 1,500 times a minute. An expert does excellent work with this machine, which cuts marble as easily as the carving of steamed wood.

* * *

A somewhat novel "safety" boiler has been invented by M. Chatenel, a French engineer. The boiler consists of a nest of horizontal tubes placed over the furnace, and into this nest water is injected in the form of spray, under which conditions it is instantaneously evaporated and superheated. Water in bulk is never admitted to the tubes. It is stated that the tubes do not burn out, and the evaporative power of the boiler is remarkable.

* * *

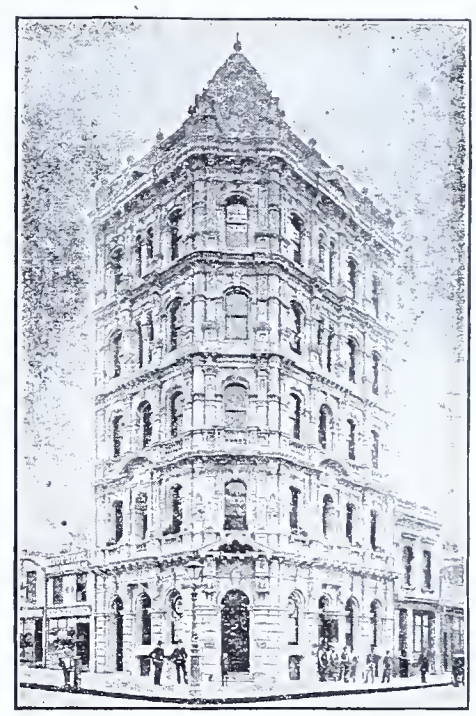
A vibrating helmet for the cure of nervous headaches has been devised by a French physician. It is constructed of strips of steel, put in vibration by a small electro-motor which makes 600 turns a minute. The sensation, which is described as not unpleasant, produces drowsiness; the patient falls asleep under its influence and awakes to find that the pain has ceased.

* * *

A little steamer of 100 tons is at present, according to press dispatches, being constructed at Argenteuil, according to the invention of M. Bazin, which consists in rolling the ship over the water instead of forcing it through as at present. To this end a number of enormous copper cylinders are fixed to the vessel, the speed attained depending upon the speed of the metal cylinders, and it is computed that 31 knots an hour can be easily made.

Australian Patents.

Next to the United States no field offers better returns for inventive genius than Australia. Its people are progressive and enlightened, and with the exception of brief periods the development of



this great country has been swift and certain. It is rich in resources and destined to become one of the most contented and richest communities on the globe. American inventors should not lose sight of this fact. An invention worth patenting in any foreign land is worth patenting in Australia, where the people and their disposition are very much like our own. THE INVENTIVE AGE is pleased to call the attention of its readers to the announcement of George G. Turri, the well known Melbourn patent solicitor, in another column. For convenience and to guarantee absolute reliability and promptness this firm has selected THE INVENTIVE AGE to act as a sort of information bureau and agency for American business, and we assure our readers that any information we can give will be given cheerfully and any business entrusted to us will be transacted promptly and efficiently.

Turri & Co. are the Australian agents of THE INVENTIVE AGE and the accompanying cut is an illustration of their headquarters, the Sun building, in Melbourn.

Practical Inventions.

American people are nothing if not practical. No better proof of this exists than the long list of patents granted by the United States every year; patents that take their place in practical life demonstrating themselves not only useful and profitable, but necessary to such an extent that the world marvels how it ever got along without them.

Every one is conversant with the great inventions of Edison, Bell, Morse and others equally famous in their line, men who are born originators, whose achievements have been tremendous. But what about the great mass of inventions and improvements in social and industrial life that have come from the most ordinary and commonplace types of humanity, neither especially endowed with intellect or learning, but just every day kind of men and women? The world accepts these inventions with little marvel, but of a truth they are greater in combination, and more universally practical to the human race than some great wonders of discovery wrapt in the mazes of science.

The beauty of American invention is the possibility of turning ideas into practical and profitable account; for the patent laws give, for a few dollars, a property in ideas which is encouraging; thus, from the beginning of an "idea," there is an incentive to carry it forward. The average American brain is prolific, and whether it cap the head of a farmer, an artisan, a tradesman, scholar or dreamer, or even a farmer's wife or an ingenious woman, when a want is felt or seen that versatile brain sets about thinking, and directly, after throes of modeling and experimenting, lo! the humble, every-day thinker has become an inventor. And while colossal fortunes have been made by great patents, multitudes of every class of society have derived good incomes from inventions of comparatively trivial importance, to say nothing of the immense practical benefit to the human family. Often times an urgent need has brought about an invention for no other purpose than the inventor's accommodation, who himself awakes to find it necessary also to the whole world. A practical man conceived the idea of shaping the end of a common screw like the point of a gimlet; its benefit was universal, its financial harvest immense. A metal toe cap for children's shoes originated from the humble need for some saving plan for covering hungry toes. The gummed paper wrapper was only a happy thought from merely a practical brain. The safety pin—who knows its harvest? it is only a simple patented device. The rubber tipped pencil, the fountain pen, the patented shoe string, the pocket match safe; indeed an avalanche of simple things might be enumerated, together with larger numbers of more important ones, from the farm reaper in the fields to the churn and dish washer in the house: from the manifold industial wonders, the innumerable kinds of machinery in work shop and factories throughout the world—the printing presses, the cash railways, the typewriters, the hordes of improvements affecting every class and condition of man—all either simple or intricate outcomes of every day need.

Facts are ever present of unlimited wealth made from the sewing machine, the telephone, and from the great electrical patents; but no less certain are the successes from simpler devices within the reach of every average man or woman. The present prolific aspect of American invention demonstrates a vast and productive region before the world, if time and thought now wasted by many, were turned in that direction.

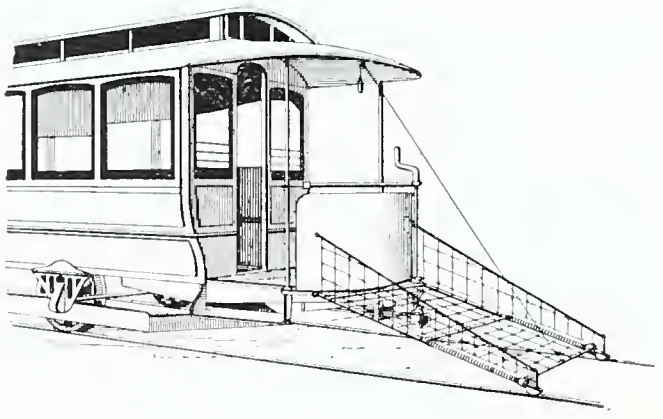
It might seem to a limited vision that the field of invention was already completely covered, and there was not another new thing under the sun to be conceived; but as this century demonstrates immense improvement over the conditions of the past, so is it possible for the advance thought of this day to go on in greater practical wonders of the future. The new discoveries of electricity, for instance, are sure to suggest needs to the fertile brain of unlimited inventions for its homely and most practical use. And as electricity is but one of the great forces that are to usher in the new century, it is not possible to foretell the practical inventions that are already foreshadowed. American ingenuity is certain to advance as rapidly in the future as it has in the past fifty years, and it is just as certain to lead the world—the greatest in small inventions, as well as the most marvelous in scientific ones. There is but one note to be sounded, "Keep on and be practical."

Protection to Inventors.

It is proverbial that the inventor generally has only limited business sense, and is constantly falling into traps laid for his credulous soul and his boundless enthusiasm. THE INVENTIVE AGE, published monthly at Washington, D. C., is a journal especially adapted to the wants and the protection of that brainy class of inventors who are better able to benefit humanity by their genius than to successfully cope with the fakes and frauds who lay in wait for them. THE INVENTIVE AGE exposes all such schemes and publishes a list of patent attorneys disbarred fron practicing before the Patent Office. —*Atlanta Constitution.*

Safety Fenders for Street Cars.

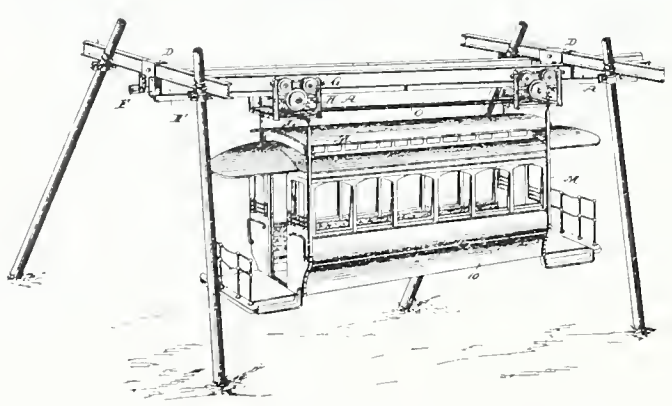
Continued accidents on street railways causes additional and intense interest in new devices for the protection of human life. In the city of Brooklyn alone last year 108 persons were killed by street railways. No less than 200 patents have been secured on safety fenders and every week one or more are added to the list. The accompanying illustration shows the design of a recent invention in this line. The inventor is Mr. Chas. O. Newton, of Homer, N. Y. His theory is that a life guard should present possibilities for the preservation of life, the principal requirement being flexibility with proper amount of resisting power. It must be of a yielding nature and avoid too much recoil or reaction. Owing to the difference in speeds when contact is made or likely to occur it seems necessary to have an average amount of resistance to compensate for such irregularities. Newton's fender is attached to



car with hinges allowing it to be drawn up against end of car at will. There are two projecting rods about five feet long. Two cross bars are attached firmly to the rods. The outer end of each rod has a spiral spring around it about thirty inches long. The whole frame work is covered with rope netting. On the outer ends of the rods steel slides or shoes are attached to glide along on the rails. A cross bar connects the slides and presses against the spiral springs so that a yielding blow is struck when an object is encountered. Instead of pushing or crushing a human obstacle it first trips up then carries the body in the net. The inventor claims simplicity and efficiency for this device. It can be attached to any car and detached or suspended at any time. Objections have been made to projecting fenders of any kind on account of additional street space required for cars, but against the argument for safe and reliable life saving devices this ought to have but little weight.

Carriage for Elevated Railways.

John N. Valley, of Jersey City, is the inventor of a new traveling carriage or hanger that might be utilized to great advantage on elevated railways, in which event the causes of the numerous street railway accidents that now exist would be avoided. Mr. Valley believes there exists no good reason why electric street car systems cannot be operated by



overhead wheeled carriages as shown in the accompanying illustration. In such a system there would be little danger of derailment and perfect safety against loss of life and limb incident to surface trackage in present systems. It is claimed that such a system can be economically constructed and operated and that a much greater speed can be maintained with less danger than is possible with the systems now in vogue.

A Belgian inventor has devised an immense lamp such as has probably never been seen before. It is composed of 3000 pieces, six feet high, and measures 7.10 feet in diameter. It is fed with lard oil, and the consumption is said to be very small.

The Quincy Lithograph Scandal.

At last the result of the investigation of the Senate Committee on Printing in reference to the Josiah Quincy lithograph scandal has found its way into print. Suppressed in the senate because of the alleged failure of Mr. Manderson to attach his name to the "whitewash" report and only incidentally referred to by Senator Gorman in the closing days of the session, the true essence of the report, it is believed, has finally come to light, through the enterprise of the Washington Star. Readers of THE INVENTIVE AGE and friends of the Norris Peters establishment, that was for the brief period of one year made the victim of an unholy combine of men well up in the nation's councils, will be interested in the following alleged exact text of the suppressed report:

In regard to that clause of the resolution which directs this committee to inquire into the connection with this contract of any official or officials of the United States, the committee finds that no other official than the Commissioner of Patents and the Secretary of the Interior (whose duty it is under the law respectively to execute and approve the contract) were concerned therein, excepting the Hon. Josiah Quincy, who was at that time Assistant Secretary of State. Mr. Quincy in his testimony explains in some detail his connection with the matter. The committee has no conclusions to present in regard thereto, except to say that while it has discovered no evidence to show any direct pecuniary interest on the part of Mr. Quincy in the National Lithographic Company or its profits, yet he admits to have advanced considerable sums of money to the president of the company prior to and after the company obtained the Patent Office contract, and while he disclaims any pecuniary interest in the company and avers that his only motive in aiding the company was personal friendship for Kenney, it is evident that by frequent intercessions in his behalf he was advancing and bettering his position as the creditor of an impecunious debtor.

The committee concludes from all the circumstances of the case that the duties of an important branch of the public service has been performed in a dilatory and to some extent inefficient manner by reason of granting an important public contract to a concern not properly equipped for the execution thereof. The committee is unable wholly to acquit the Commissioner of Patents of blame in not having made more diligent and thorough inquiry into the capacity of this newly organized company to perform the very extensive and important work which it undertook and in trusting entirely to the unsupported statements in that regard of the contracting parties themselves and Mr. Quincy, which he admits to have done. The committee thinks that the former failure of the Bell plant to do the work, of which he was aware, should have put the Commissioner upon his guard, and prompted him to more careful investigation. The fact of his having executed the contract with the new company and transmitted it to the Secretary of the Interior with a request for his approval on July 21, when the new company had done no work whatever, and had already by several weeks' delay demonstrated its incapacity to do the work promptly, appears to the committee to evince a persistence and determination on the part of the Commissioner to sustain the new company, apparently not warranted by the small saving to the Government involved in its proposal.

The committee is aware that the Commissioner justifies his action on the ground that he expected ultimately to effect a benefit to the Government by creating competition for Patent Office work; but without questioning the integrity of his motives, it is unable to commend his action on business principles. The provisions of the then existing law regulating this contract in giving to the Commissioner of Patents an unlimited discretion in awarding the same were, in the judgment of your committee, essentially faulty. The Commissioner was, therefore, subjected to importunity which he appears to have been unable to resist. The dismissal of Joseph B. Marvin, the chief clerk of the draughtsmen's division of the office, was, in the judgment of your committee, an unjustifiable action on the part of the Commissioner of Patents. A faithful public officer seems to have thereby been made to suffer for a conscientious discharge of his official duty in rejecting the inefficient work of the National Lithographic Company.

The latest *invention* to faciliate field operations is the typewriter bicycle. This consists of a typewriter mounted on a serviceable wheel, which can follow the movements of the army through an ordinary stretch of country. The operator can take commands and general orders in shorthand, and strike off several duplicates on the typewriter, being held erect by portable props. It has been tried in England, and worked very satisfactorily.

The Searchers of the Skies.

From ages remote the mind of man has turned toward the stars, impelled by that unfathomable desire to solve the mystery of the skies, which seem so closely connected with our spiritual being. For from childhood we have been taught that somewhere in illimitable space we shall find our eternal abiding place.

But the mind of the astronomer, who gazes upon the beautiful constellations swung out overhead, is filled with facts and figures—cold facts that reduce to a mathematical science the relationship of his own sphere to those that through their subtile media influence the earth to a greater or less degree.

Our government has contributed much toward the progress of astronomical science, and its equipment for stellar research, as seen in the New Naval Observatory, situated about four miles northwest of Washington, makes this department one of the finest of its kind in the world. Here can be seen a number of telescopes, ranging in size from the small 5 inch glass, through which the star-gazing public are allowed to inspect the skies, to the celebrated equatorial instrument, which is 32 feet long with an object-glass 26½ inches in diameter. Up to 1873 this was the most powerful telescope of the kind ever made. It cost $47,000, and with its base, weighs over six tons. The large lens alone cost $30,000.

The great telescope of the Lick Observatory, which has an object-glass 36 inches in diameter, brought from obscurity Jupiter's new satellite and established an enviable reputation as a star-catcher. The Naval Equatorial, scanning the field above for wonders, found the moons of Mars—that planet to which public attention was directed on account of those canals (?) along whose banks no mule has yet been seen straying. With this instrument pointed at the sun, the black spots, which are seething chasms of fire, can be seen distinctly, and huge masses of flames thousands of miles long, shoot out from the great orb that seems indestructible.

Although so much progress has been made in perfecting astronomical modern appliances, great instruments were made many years ago. The celebrated Rosse telescope, finished in 1842, weighed 12 tons, having a speculum of 3 tons weight, and costing $150,000. It was a reflector, and added much to science, mainly in discovering binary and trinary stars, the resolution of nebulæ and the wonderful discoveries on the moon, whose craters yawned before the powerful machine and whose mountains stood out sharply defined against a back-ground of dreary waste upon which no dews fall and no vegetation relieves the sterile desolation.

Before the achromatic lens was invented, the aerial telescope was used with considerable success. This "telescope" had no tube, but the lenses were erected separately on stands at various distances from each other. Sometimes they were several hundred feet apart. In the old instruments used by Gallileo the eye lenses were concave, such as are now found in opera glasses.

How hard did those astronomers of old work!—Gallileo, Newton, Herschel and others, struggling with chromatic aberration, refraction, diffraction and the many other difficulties which hindered their visual inquisitiveness. Today the observer sits in his room, points the instrument at a star, sets the delicate clock-work machinery in motion and makes his observations, while the telescope follows the star as it flies on its appointed course, obedient to the Divine law.

The large lenses used in this country are cast in France, where the secret of their composition is carefully guarded. They are finished by Alvan G. Clark, at Cambridgeport, who is the greatest expert in this business in America. When a large lens arrives at the factory it is far from perfect. It is first ground as nearly as possible to its proper shape, and then it is rubbed carefully until all inequalities are smoothed away. Repeated tests are made during the work, by mounting the lens in a tube and pointing it at a star, which must appear as a perfect globe before the polishing process is completed.

Almost any day men can be seen standing on the streets of Washington a few minutes before twelve o'clock, watch in hand looking toward the State Department, waiting for the ball above its roof to fall in order to get the correct time. When this ball falls, thousands of clocks all over the country receive observatory time. The time thus distributed goes over the Western Union wires, which company has a monopoly in this business, and gets about a million dollars yearly for its time service. Anyone can get the observatory time sent anywhere if he or she owns a telegraph wire. But it is a case where *time* is *not* money—and the wire is.

The Naval Observatory is a place to gladden the eyes of a navigator, for here are kept all that is necessary to guide any craft across the broadest ocean. It is the store house for instruments used in navigating ships of the United States navy. When one of our naval vessels goes to sea she is a floating observatory on a small scale, equipped with a scientific outfit, which is the finest of its kind that can be found in the world. Before furnishing to ships their chronometers (of which each vessel has four) these valuable time keepers are subjected to extreme degrees of heat and cold, so that they will be unaffected by any climate. They are regulated from time to time and when turned over for use are as nearly perfect as science and skill can make them.

The making and publishing of the Nautical Almanac is a part of the work of the Naval Observatory. Fifteen hundred copies of this book are printed annually. One hundred copies goes to the U. S. Senate, four hundred to the House, and the remainder are distributed by the Navy Department. In the last issue of the Nautical Almanac, dated 1896, there are 534 pages.

JAMES EASTUS PRICE.

The Nature of a Patent.

BY E. L. ARNOTT.

A patent is in the nature of a contract between the government and the inventor. The grounds of the contract may be briefly stated as follows:

WHEREAS, We, the people of the United States, believe that the progress of the useful arts and improvements in articles of commerce add to the comfort, welfare and producing power of the public in general; and

WHEREAS, We, the people of the United States, desire that such progress and such improvements be made; and

WHEREAS, Some individuals have the peculiar powers of imagination and reasoning necessary to promote such progress and to produce such improvements.

Therefore, be it resolved, That for and in consideration of legal specifications and descriptions clearly written, and suitable drawings setting forth and illustrating such inventions, for the guidance and instruction of the public, we, the said people of the United States, jointly and severally covenant and agree to refrain from making, using or vending such patented improvements for 17 years, without the permission of the inventor, in order that the said inventor may have the entire benefit and profit of his invention; said benefit and profit to serve as a stimulus to encourage the inventor to give the time, labor and money necessary to mature and perfect his invention; and

Be it further resolved, That we do establish and ordain courts of justice, representing the people, to judge between man and man, and to impose suitable fines upon, and issue suitable injunctions against, those who violate this contract and infringe said patents.

And this shall be the law in order that the progress of the useful arts may be justly promoted, and improvements in articles of commerce may be rightly encouraged.

(Signed), GOVERNMENT OF THE UNITED STATES.
THE INVENTOR.

Domestic Economy.

One of the most important inventions of the present time would be a system of domestic economy by which all housekeepers would save waste which now exists in the management of nearly every home in this country. In the majority of American households twenty per cent of everything that enters into its general administration is wasted. Some of it by neglect, some of it by the general spirit of wastefulness and extravagance which pervades, for some mysterious reason, the American atmosphere. It seems that because we have the largest rivers, the broadest plains, the highest mountains, the most stupendous waterfalls, and the biggest lot of political cranks on earth that we must have the highest water mark of extravagance in the administration of our domestic affairs. Enough is wasted in the ordinary American kitchen in one day to supply an English family for one day, or supply three French families for one day and the probability is that a Chinaman would live a week on what is left over. The American housekeeper must learn to save and apply the principle of economy in every department of household affairs. As our population becomes more dense there will be a great competition in the labor market and wages will become more and more reduced. This is the inevitable, and the American masses will be wise if they set their sails according to this wind which is bound to blow, and the only way to meet this emergency will be to study the principles of practical economy and apply them vigorously to our every day life. It is not mean to be economical but it is criminal to be wasteful, and he who best understands practical economy will be able to best navigate his home ship.

Photophone.

To a reporter of the Milwaukee Sentinel, Dr. Alexander Graham Bell said recently:

"I have worked many years on the photophone, and have recently discovered a means by which it is simplified and cheapened very much. I will describe the instrument by telling about an experiment with it at Washington. A friend with a thin silver mirror placed himself at a considerable distance from my office, and reflected the sun's rays into my window. He spoke to me from behind the mirror, which vibrated like a diaphragm of a telephone. This gave the beam of light a vibratory character, and in my office I focussed the rays as much as possible. By means of a little pencil of selenium, a very rare element, the vibrations were communicated to a telephone at my ear, and I could hear the words quite distinctly. I hold to the theory that light and electricity are much the same thing, and as selenium has a wonderful resistance, I was led to apply it to the photophone. It was used in the laying of the Atlantic cable in substitution for immense coils of wire, on account of its resistance power, which is as great in a piece of the substance an inch long as a wire that would reach from here to the sun. It was found that the resistance was not always the same, and then, by experiments, the discovery was made that it was affected by light. It is very sensitive and communicates the vibrations accurately. I have now discovered in my recent work, however, another substance that is much cheaper than selenium and works more satisfactorily. It is nothing more than common soot or lamp black, which has as great a resistance as selenium and is as sensitive. Throwing the focussed light on a bottle of the soot or a test tube filled with it, the telephone apparatus may be dispensed with. Held to the ear the soot speaks so loudly that it is almost painful. An intermittent light cast upon it will produce a sound without anybody speaking.

"Artificial light cannot well be used on account of its unsteadiness, though in France I found one kind of electric light that worked very satisfactorily. The trouble with the practical use of the photophone is that the sun does not stand still. Still I think it may be used in some ways—to take the place, for instance, of systems of signaling between two points. I have discovered, also, that heat produces much the same effect as light, and hence I have called the general subject 'radiophony.'"

Inventor's Experience.

COUNCIL GROVE, KS., Oct. 22, 1894.

The Inventive Age, Washington, D. C.

GENTLEMEN: The copy of the Inventive Age received all O K.; thanks. I was a subscriber of your paper two years ago, and would like very much to start in on another year's reading. You say that you would like to learn what my experience has been in selling patents. That can be explained in a very few words. My experience is this. If a man invents and patents a good thing, and has not the necessary means to place it on the market, *he is left*; but if you have a good thing and they see you are prepared to push the same, you can get plenty to take hold with you. But in my case, I can get plenty to help me out, or in other words, beat me out of my "Patent Hitching Attachment." I have offered big inducements to parties to buy my invention but have made no sales yet. People imagine when parties offer to sell a patent at a sacrifice, it is no good and hardly ever pay any attention to an adv. of that kind. I have the finest invention that has ever been shown up, as a hitching attachment. I had an order for sixty posts from one party in Colorado. They were to be placed in a livery stable. Not having the means to get the casting done and other parts of posts, I could not fill the order. I have waited now nearly two years to get in shape to manufacture, but sorry to say, no better off yet. I have lost my health and must seek a dry climate if possible. I will sell the entire patent, outright, for one hundred and fifty dollars.

Respectfully yours,
L. B. HOPKINS.

Endorse the "Inventive Age."

WELL PLEASED.

HOUSTON, VA., June 10.—I am well pleased with your paper.
I. GRAMMER, M. D.

GLAD TO RENEW.

DUQUESNE, PA., May 8.—I am glad to renew my subscription for your paper as I am well pleased with it. It is well worth the price you charge for it.
R. C. SNOWDEN.

FULL OF INTERESTING MATTER.

PITTSBURG, PA., April 6.—I find your paper is full of very interesting matter.
E. D. SMITH.

WORTH THE MONEY.

SEYMOUR, CONN., April 20.—I think your paper is really worth the money.
E. F. BASSETT.

SUPPLIES THE INFORMATION WANTED.

WALPOLE, N. H., February 10.—I am more than pleased with the INVENTIVE AGE. It exactly supplies the information and news that I want.
A. E. GUILD.

KEEPS INVENTORS POSTED.

REPYVILLE, KY., April 25.—I like your paper very much. It is just the paper for inventors. It will keep him posted on the workings of the Patent Office and a great many other things that are useful to him—and new ideas are very often advanced that will help him in his particular work.
C. W. BOND.

BEST FOR THE MONEY.

PHOENIX, MD., June 20.—I consider it the best paper for the money I have ever seen.
OWEN C. MORRIS.

WOULDN'T BE WITHOUT IT.

CHICAGO, ILL., Feb. 8.—You will please continue the "Age," as I would not be without it for any amount of money.
I. ROSENTHAL.

HATES TO MISS A NUMBER.

DESOTOVILLE, ALA., June 1.—I hate to miss a number, for I am well pleased with the paper.
W. A. BROWN.

SCIENCE FOR YOUNG PEOPLE.

Conducted by E. P. Lewis.

When certain substances, such as some compounds containing lime, have been exposed to a strong light, they will, on being placed in a dark room, themselves give off light for some time. This property is called phosphorescence, and may often be observed in rotten wood. A "luminous paint" can be made of sulphide of lime, and will furnish enough light to enable house numbers painted with it to be read at night. The latest use of this property has been made by a German named Ebert, who has made what he calls a "luminescent" lamp, consisting of a cake of compressed luminous paint, sealed up in a glass vessel from which the air has been almost completely exhausted. By itself the paint could furnish only a very feeble light, but the effect is intensified and maintained by the action of alternating currents of electricity. On each side of the glass vessel is fastened a strip of tinfoil, each strip forming one terminal of the electrical circuit. The oscillating electrical current sets up discharges through the glass vessel which excite the paint and cause it to give out considerable light. Tesla has also been working on the problem of securing light from rapidly alternating currents of electricity, and no doubt this will some day be the means of securing the most satisfactory light.

The manifold uses to which electricity and magnetism have been applied in recent years seem to have led to a popular belief that they are as all-powerful as a magician's wand. It has become a common habit to attribute every unexplained phenomenon to electrical agency, and quack doctors especially have reaped a golden harvest from this delusion. The most careful tests made with the most powerful magnets have failed to show the slightest effect of magnetism on the human body; nevertheless "magnetic healers" still flourish. Electrical currents, on the contrary, undoubtedly have some effect, and are very useful in the treatment of disease when applied by those who have made a careful study of the subject. In many cases, however, electricity may do more harm than good and its indiscriminate use by those ignorant of its properties should be discouraged.

* * *

Some persons have advanced the idea that electricity is the basis of life itself. It may or may not be so; there is little to be said on either side until we know more about the nature of electricity. Be that as it may, it is certain that it has a good deal to do with the processes of life. It has been found that if two electrodes connected to a sensitive galvanometer are made to touch various part of the body, and if the skin near one electrode is tickled, or pinched with a needle, or its nerves excited in any way a deflection of galvanometer needle will show the production of an electric current. It may very well be that our nerves are merely telegraph lines which convey from all parts of the body electric signals to that wonderful central station, the brain.

* * *

Nearly all great discoveries seem to be made by accident. While looking for something entirely different, people often stumble by the merest chance over discoveries which it would seem ought to have been made long before. For a long time chemists have been on the alert to discover new elements, and occasionally have succeeded in doing so by carefully analyzing different substances. It has been supposed that no unknown substance could possibly be hiding in our atmosphere, so thoroughly had it been explored. Nevertheless the great sensation of the year is the discovery recently made by Lord Rayleigh and Prof. Ramsay, two eminent English scientists, of a substance which forms about one per cent of our atmosphere, and which has every appearance of a new element. In redetermining the density or relative weight of nitrogen these scientists found that nitrogen taken directly out of the atmosphere always weighed a little more than that rescued by chemical methods, although they took all precautions to make both specimens equally pure. Taking a quantity of what appeared to be pure nitrogen obtained from the air, they treated it by chemical methods which absorbed the nitrogen and found that a small quantity of a heavier substance was always left behind, which refused to act like the nitrogen. No such conduct was observed in nitrogen obtained by other means. The new substance refused to enter into chemical combination with any other element, and on account of this inactivity has received the name of argon. This word, derived from the Greek, means when freely translated, a thing that won't work. When an electric spark was passed through the argon and viewed through a prism, the resulting spectrum was found to be very different from that of nitrogen, and this is perhaps the strongest evidence that it is a new substance. It weighs half as much again as nitrogen, and has a different appearance when liquefied by intense cold and pressure. Since this discovery was made it has been found that Henry Cavendish, an English chemist who lived a century ago, had really found argon and referred to it in his works without realizing it and without the remark alluding to it attracting any one's notice until the substance had been rediscovered. The moral of this story is that all young people of scientific tastes should cultivate their powers of observation, and should pay special attention to all these little apparent deviations from general laws which may, as in this case, indicate the effect of some unsuspected cause.

* * *

Just as important scientific facts may lie concealed in the most familiar things, so may suggestions of valuable practical inventions be found in abundance by a mind trained to see how some simple device may economize our daily labors. The merest trifles, which would seem to most people of no importance whatever—a window sash fastener, an ink eraser, a new puzzle—may turn out to be a mine of gold. The young readers of THE INVENTIVE AGE whenever they have any task to perform, should endeavor to think of some means by which the time or labor of doing it may be simplified. Perhaps some of them may by this means make some useful invention which will enrich themselves and benefit others.

A Big Electromagnet.

A coil of wire through which an electric current flows acts in all respects like a magnet, and a piece of iron placed within it becomes itself powerfully magnetized. The magnetism thus induced is permanent if the core is of cast iron or steel, temporary if it is of soft wrought iron. In the latter case, the core while it is under the influence of the current is called an electromagnet, as distinguished from a permanent magnet. An electromagnet is far stronger than one of the permanent kind—in fact, there is no limit to its strength, as it increases indefinitely with the size of the core, the number of turns of wire around it, and the strength of the current used. Probably the strongest electromagnet ever made was tried Dec. 21, at Willett's Point by Lieut. Col. A. W. King. He had previously made a very powerful one of the horseshoe type out of two Rodman cast iron guns connected at one end by a bar of iron and wrapped with heavy insulated wire. In his last experiment Col. King used only one of the guns, weighing 50,000 pounds and wrapped with 14 miles of wire. Through this was passed a current of from 20 to 50 ampered from a dynamo. It exerted a pull of 44,800 pounds—nearly its own weight—on an armature made of six heavy iron plates bolted together. The limit of its strength is not yet known, as the chain through which the pull was applied broke at this point. Five 325 pound cannon balls were also suspended in a row from the muzzle.

The lifting power of electromagnets which are similar in shape and made of the same quality of iron is approximately proportional to the square of the cube root of their weight, or, what is the same thing, to the areas of their polar faces. Bar electromagnets weighing only a quarter of a pound have been made to lift over 50 pounds, and by applying the above rule we find that Col. King's big magnet, which weighs 50,000 pounds, should lift over 150,000 pounds. At any rate, making allowance for the fact that it is of cast, not wrought iron, it ought to be able to lift 100,000 pounds.

The strongest permanent magnet of its size on record is one said to have been worn by Sir Isaac Newton in a ring. According to tradition this would lift 200 times its own weight. Joseph Henry, to whom we are indebted for a large part of our knowledge of electromagnetism, made an electromagnet for Yale college weighing 59.5 pounds which could lift 2,063 pounds. Some years latter Joule, the Englishman, who turned his beer brewery into a laborator in which he did some of the best scientific work of the century, made some magnets even more powerful. The most interesting of these was a tiny horseshoe made of a piece of iron wire a quarter of an inch long and one twenty-fifth of an inch in diameter, wound with three turns of wire. This little magnet, which weighed only one-half grain would lift 2,834 times its own weight.

E. P. Lewis.

Platinum has been drawn into smooth wire so fine that it could not be distinguished by the naked eye, even when stretched across a piece of white cardboard.

Inventions in the Wool Manufacture.

By S. N. D. North.

[Read before the American Association of Inventors and Manufacturers at Washington, D. C., January 15, 1895.]

(*Concluded from last month.*)

We come now to the weaving machinery. In this department of wool manufacture, it can be safely claimed and easily demonstrated that American inventors have achieved more for the mechanical advancement of the manufacture, than those of all other countries combined. The invention of the power loom, as is well known, was due to the genius and the persistance of Dr. Edmund Cartwright, an English clergyman, whose attention was first directed to the subject by casual remark, overheard at a hotel dinner table, that the Arkwright spinning machinery must result in the spinning of so much cotton yarn, that hands enough to weave it all could not be found. To this suggestion that mechanical weaving must necessarily follow the successful application of mechanical spinning, the empirical reply of all present was that such a thing was impracticable; that the limitations of machinery had at length been reached. Thereupon this clergyman went to work to demonstrate that this could not be so. He had nothing to guide him but a theory; but that theory is one of so much practical value that I feel like repeating and emphasizing it, in the presence of this company of inventors and manufacturers. There is no operation of the human hands, in manufacturing of any kind or description, the automatic duplication of which, by mechanical contrivance, persistently and intelligently pursued, can not be achieved. Every such hand operation regarding which the application of mechanical methods has been seriously contemplated, will eventually be mechanically performed, provided only that the demand for the article is sufficient to warrant the expenditure of the time, labor and capital which may be necessary to acheive the result. It follows that the field of invention, particularly in the textile manufactures, so far from being exhausted, is only fairly opened to the inventor.

To justify this statement, I need only to compare the original Cartwright power loom, with the wonderful mechanisms which perform the work of weaving in a modern wool factory. Describing the first power loom, the inventor said, "The warp was placed perpendicularly, the reed fell with the force of at least half a hundredweight, and the springs which threw the shuttle were strong enough to have thrown a Congreave rocket. It required the strength of two powerful men to work the machine at a low rate, and only for a short time." Nevertheless this clumsy instrument had in it the essential elements of the modern loom—it contained in rude form the mechanical substitutes for the weavers' hands and feet, including tappets and treadles for operating on the warp, taking up the cloth, stopping the loom on the breaking of the warp or weft thread, or when the shuttle failed to enter the box, and self-acting temples. This machine was first operated at Doncaster in England, in 1789, hardly more than a century ago, in a cotton mill, and its introduction was a dire financial failure, costing its inventor the loss of an inherited fortune.

From it sprung the nearly perfect loom of today. Its improvement at first was very slow. It was not until 1828 that the loom for weaving broad goods was introduced. The fancy loom was not in successful operation until 1840. It was a direct outgrowth from the cotton loom invented by George Crompton in 1837. Samuel Lawrence, having possessed himself of a sample of fancy cassimere then recently first made in France, on handlooms, applied to Mr. Crompton in that year and urged him to attempt an adaptation of his cotton loom for weaving this product. A long experimentation resulted in success, and a new era in the world's manufacture was begun. "Not a yard of fancy woolen fabrics," wrote Mr. Lawrence, "had ever been woven by power loom in any country, till done by Mr. William Crompton at the Middlesex Mills in 1840." Before the committee of patents in the House of Representatives in 1878, it was affirmed that "upon the Crompton loom, or looms based upon it, are woven every yard of fancy cloth in the world."

One invention leads to another, and the Crompton loom was followed in time by the Knowles open-shed fancy loom, first patented in 1863, a marvel of ingenuity for smooth and rapid work, and facility for effecting changes. Mention should also be made of the several looms of the Thomas patent, for weaving a variety of fabrics; the Wood loom, and the Lyall positive motion loom, the first loom in the world which dispensed with throwing the shuttle, equally adapted for weaving goods of great width or of the narrowest dimensions. With all these inventions in our mind, we can understand the remark of Dr. Growthe, the German expert: "The greater part of your invented machinery is superior to the English, French or German machinery,

especially your looms for finer work, your looms for cotton goods, cassimeres, carpets and heavy work."

Up to 1857, woolen looms were run at about 45 picks per minute. In that year appeared a Crompton fancy loom, with 24 harness capacity, and three shuttle-boxes at each end, operating at a speed of 85 picks per minute. This was a great stride in production, and no advance has since been so great. Other improvements since introduced by the Knowles Loom Works and the Crompton's have made it possible to speed broad looms up to 90 and 95 picks per minute, and in some instances to 100 and 105 picks. The various devices for facilitating production enable a larger production to be had from looms now manufactured than the difference in speed alone would indicate, and some manufacturers estimate the gain in production as equal to 100 per cent in the last thirty years.

Looms of American pattern and improvement are now very largely used in England, and their superiority to the looms of other countries is conceded. These improvements have resulted in a greater regularity in the product, less waste of the material, and greater saving of labor: one weaver in the lighter fabrics easily attending to two and even four looms. The power loom is worked without muscular effort; dexterity in the repairing of broken yarns being the chief requirement of the operative; consequently, women have largely superseded men in its operation.

I am far from claiming that the power loom for woolens is finally perfected. The Draper establishment at Hopedale has recently shown what can be done with the cotton loom, and it cannot be doubted that these marvelous devices for an automatic change of filling bobbins, and an automatic stop motion with every broken thread—improvements which will make a revolution in cotton manufacture greater than any since Arkwright—will ultimately be applied to woolen and worsted looms, in all the plain work, and perhaps in the fancy work as well.

I cannot leave the subject of improvements in the power loom without allusion to the extraordinary achievements of American inventors in the perfecting of the carpet loom—achievements which are unique, and have placed our country in advance of all others in the manufacture of carpets. These inventions have made the name of Erastus B. Bigelow known throughout the world; up to the time when Mr. Bigelow succeeded in making the carpet loom automatic, the English machinery was superior to our own, and the jealousy with which it was guarded made it impossible for American manufacturers to equal the carpets then imported from England in much larger quantities, relatively, than has since been the case.

In co-operation with Mr. George W. Lyman, treasurer of the Lowell Company, who supplied the funds, Mr. Bigelow worked out the device he had conceived, and by 1844 the successful weaving of ingrain carpets by power had been achieved at Lowell. From that time the history of the ingrain carpet manufacture of this country has been a record of constantly extending development.

Mr. Bigelow next devoted his energies to the invention of power looms for weaving Jacquard, Brussels and Wilton carpets. The supplemental report of the jury at the London Exposition of 1851 declared that the specimens of these classes of carpets exhibited by Mr. Bigelow were "better and more perfectly woven than any hand-loom carpet that had ever come under the notice of the jury." This, however, was but a small part of their merit, or rather that of Mr. Bigelow, "who has completely triumphed over the numerous obstacles that presented themselves, and succeeded in substituting steam power for manual labor in the manufacture of five frame Brussels carpets."

Still another of Mr. Bigelow's inventions was that for weaving tapestry carpets. We have from the Roxbury Carpet Company, long engaged in this manufacture, authentic data of the progress made in the manufacture of this style of carpet, as the result of this and successive inventions. The production of hand looms was but five yards per day. In 1856 the average product of each power loom in these mills was 16 yards. In 1880 the average product of each of 114 looms was 49.5 yards per day, and this average has since been slightly increased.

The American manufacture of Axminster carpets, the most luxurious carpet that comes from the power loom, and previously manufactured only in France and England on hand looms, dates from the year 1867. A patent for weaving these carpets by power was awarded to Alexander Smith and Halcyon Shinner in 1856; but the destruction of their factory by fire and other obstacles, prevented its utilization until 1867, since which time the product of their mill has in some years equalled the entire annual production of these high grade carpets in France and Great Britain. A still more recent invention is the power loom for getting and weaving Smyrna rugs. The Smyrna rug or carpet is a double faced fabric, one side being the fac-simile of the other. They are woven with one warp and two wefts, one of the latter consisting of coarse jute, the other of particolored twisted chenille, a thread of each being shot or thrown alternately. After each weft or chenille is shot, it is necessary for the weaver to set or adjust it with reference to the preceding weft of chenille, so as to form the figure, and to accomplish this the loom must be thrown out of action after every second shot or pick. The mechanism which successfully accomplishes the starting and stopping of the loom for these purposes was patented in 1889, and the largest remaining field of the hand loom thus taken away from it.

It will be noticed that I have alluded to no American inventions in connection with the worsted manufacture. It is notable that American ingenuity has done little for the mechanical advancement of this branch of the wool manufacture. The reason why is obvious. Although small attempts at the manufacture of combed wool were made in this country as early as 1843, and the first combing machines were introduced as early as 1855, yet it was not until well along in the civil war that the industry obtained a firm footing among us. By that time English, French and Belgian inventors had brought the mechanism of the worsted manufacture almost to its present state. It is worth attention, in the same connection, that practically all the worsted machinery now in operation in this country (except such as is used in carpet mills for coarse carpet yarns), is of foreign make.

Exceptions should be made, however, in two notable branches of worsted manufacture. The best machinery for making worsted braids is of American invention, the pioneer in this field having been the late Darius Goff of Pawtucket, R. I. Very largely owing to the ingenuity and indomitable persistence of the same man is due the fact that we have now a mohair plush manufacture in this country sufficient to supply all our needs and utilizing weaving apparatus chiefly of American design.

I have confined this historical sketch to the improvements in the three principal departments of wool manufacture, carding, spinning and weaving. Lack of time prevents any excursion into the other branches of industry; but I want to say that in these other branches the inventions of Americans have contributed very largely to the rapid advancement of the industry. I can only allude to a few of the most notable among them, including the helicoidal shearing machine of George Bass of Boston (1812); the burring machine of Michael H. Simpson of Boston (1833); the felted cloth machinery of Thomas Robinson Williams of Rhode Island; the power loom for the Axminster carpets, invented and perfected by Alexander Smith of Yonkers, N. Y., (1856); the circular knitting machine of John Pepper (1851); the knitting machine for ribbed work by the Aikens—father and son; the knitting machine of Kilbourn, the first complete automatic knitting machine for making fashioned knit goods ever operated anywhere; the Lamb machine, the Nelson machine and a number of other knitting machines, each with some special excellence. More especially in the field of automatic knitting machines have American inventors eclipsed the world. We owe the splendid mechanism of the modern knit goods mill almost entirely to our own inventors, and a chapter on its evolution would be a very valuable contribution to the literature of this Association.

The woolen and cotton manufacture have had substantially a simultaneous mechanical development. Nearly every important invention in one line has been turned to good account in the other. Cards for the combing of cotton were first adapted from the wool manufacture, while on the other hand the wool manufacture owes a vast debt to men whose inventions were first applied to cotton. It is hard to strike a balance in this reciprocal obligation and unnecessary to attempt it. All the textile industries are conducted on the same general mechanical principles, and neither of them can be said to have advanced more rapidly than the other. If there is any limitation to this statement, it is because the wool manufacture is a much more complicated and delicate industry than that of cotton on account of the peculiar characteristics of the fiber, its almost endless variety, and the greater difficulty and detail of the finishing processes. For these reasons the mechanism for the spinning of woolen and worsted yarns has not reached that marvelous perfection and rapidity that mark it in cotton, and never will.

Again, a great many inventions are made and patented, particularly in the wool manufacture, which seem to their authors to be valuable, but which do not prove so in actual experiences. I have a table furnished by the Patent Office in 1890 which shows the enormous total of 8,890 separate patents issued since the founding of the office for as many distinct inventions connected with the textile manufacture. Of this total 1,194 were connected with carding, 1,189 with knitting, 1,921 with spinning, 2,954 with weaving and 401 with cloth finishing. Not one in one hundred of these inventions has gone into permanent use; but the summary is interesting as proving the extraordinary activity of American inventors in the textile manufacture, and as bearing out, in a general way, the claim that the United States has contributed more than any other one nation to the astonishing development of the last one hundred years in this field.

It is not generally understood how much of the credit for this fact is due to our machinery manufacturers. These are the men who spend their time and money in testing new inventions and determining their value. Frequently they take a crude idea and by long experimentation gradually bring it to the point of great utility. Skillful and ingenious mechanics are always at work under their direction, studying how to improve and to economize. I recall a remark of the venerable George H. Davis, of the Davis & Furber Company of North Andover, at one of the meetings of the Association of which I am secretary, in which he said, "We machinists become very conservative, and in some instances do not recommend a new invention as strongly as its merits might justify, from the fact that we have so many inventors call upon us to exhibit what they consider valuable inventions, urging us to try them in our machines, which generally prove to be of no value. We test with great care and cost many mechanisms which we can never utilize."

In these days—the grand primary principles of textile mechanism having all been applied—each further advance in the machinery of the wool manufacture, as of other industries, must be the result of much painstaking effort that reaches beyond the labors of the inventor himself. No new machine, or important modification of an old one, is now adopted, the practical utility and advantage of which have not been severely tested. The gain to the manufacturer lies in the fact that the expense and the risk of this test, which he formerly bore, is now taken by the machinery manufacturer, who must also take the loss which is almost always involved in the test.

This review of American inventions in the wool manufacture has been cursory and superficial; but it will have served its purposes if it furnishes you with some standard with which to approximately measure the increase in efficiency which has resulted from these inventions. I have already said that we date the beginning of the machine manufacture of wool in this country from the year 1794. The advances I have alluded to thus cover one complete century. Mechanical wool manufacturing in England did not antedate its introduction here by more than a quarter of a century. It follows that there has occurred in these one hundred and twenty-five years a greater progress than in all the other centuries that preceded from the beginning of time. It is impossible to adequately present the ratio of that progress by any mathematical formula. The added efficiency of the individual operative has been so vastly increased, as compared with the hand methods of antiquity, that percentages fail to photograph it. The same statement is true, if we limit our review to the advance which has occurred in the nineteenth century, since the beginning of the mechanical manufacture in this country. But if we take for our point of departure some later period, say the middle of the century or a few years earlier, we may be able to reduce the matter to something approaching exactness. What has been said will warrant the statement that a single operative has now a productive capacity, by the aid of improved machinery, easily one hundred per cent greater than in 1840, taking all the processes of the manufacture into account, and his product will be uniformly more perfect. This means that the producing capacity of a given amount of capital has been increased fully $33\frac{1}{3}$ per cent, assuming that the labor cost of manufacturing and the cost of the plant combined equals fifty per cent of the total cost of manufacturing. This statement of course has no relation to the earning capacity of capital, which has been correspondingly reduced by the operation of the same causes as well as by a variety of other causes. The gain goes to the consumer as the ultimate result of every improvement and by the operation of a law that is beyond the control of human legislation.

Tempered Aluminum.

The successful tempering of aluminum so as to give it the consistency of iron is the triumph of F. J. Fallard, the Levis blacksmith, whose discovery of the lost Egyptian art of hardening copper startled the mechanical world three or four years ago and only failed to make the fortune of the author, because of the expensiveness of the process. A recent trial of Fallard's aluminum has proved the success of his new methods, and that it can be applied to a number of articles manufactured of aluminum.

He has made and hardened a cannon, which has just been tested by Colonel Spence, American consul at Quebec, and a number of others, with success. The cannon is 28 inches long and 5.8 in diameter. A charge consisting of a pound of powder was fired out of this gun without any appreciable effect on it.

A new trial of the cannon has been ordered by the Canadian military authorities and the United States consul. Fallard has been asked to manufacture as soon as possible, a cannon 12 feet long for direct shipment to Washington.

Patent Sharks.

The next and succeeding issues of THE INVENTIVE AGE will contain additional information regarding patent sharks. By its exposures and warnings during the past year THE INVENTIVE AGE has saved to American inventors thousands of dollars and as a result of the investigations many of the frauds have been forced to the wall and others have been so crippled that they are about to give up their nefarious business. In this connection THE INVENTIVE AGE desires to thank its readers for their co-operation and assistance. The information they have furnished has been a clue on which it has been possible to run down the sharks and expose their methods.

Since the beginning of the new year additional and damaging information has been received regarding the so-called Association American Inventors at Philadelphia. The resignation of the former secretary of the Association, Mr. Hinken, upon whose popularity the little booklet of "endorsements from leading business firms," etc., was issued last season to allay suspicion against the Association aroused by the articles in the AGE, together with his exposure of the inside business methods of the Association, is a matter of more than ordinary interest to all inventors and readers of THE INVENTIVE AGE. It is also understood that sufficient evidence has been secured against Mr. Holgate, manager, to warrant his disbarment from practicing before the Patent Office and that the same has been placed before the Commissioner.

Readers of the THE INVENTIVE AGE may depend upon the fact that we have only began our investigation of all manner of frauds and impositions on the American inventor, and we do not hesitate to claim that during the coming year every reader will receive many times the small subscription price of $1 for a whole year. To new subscribers we will, if requested, send back numbers containing exposures of patent selling sharks free of charge.

Telephone Patents.

It is difficult to enumerate just which of the patents bearing on this important industry have been swept into the abyss of innocuous desuetude by the besom of Father Time, because the perfected instrument of today is a combination of many devices patented at many times, but our readers will be interested in knowing which of the more important ones are now public property. First, the Blake transmitter. Second, the Magneto instrument, whether transmitter or receiver. Third, the Berliner patent for a receiver. Fourth, the induction coil, a Berliner patent, and lastly and principally the Bell patent for the general idea of telephoning or the transmission of articulate speech by the aid of electricity.

The Edison microphone patents have lately been declared by the U. S. Supreme Court as terminated by the expiration of the foreign on these inventions.

It is a very difficult matter to decide which of the devices still alive are most important and necessary to the commercial success of the telephone, and one of the decisions against the Berliner receiver patent granted by the Circuit Court may be overruled by the U. S. Supreme Court and thus resuscitate a valuable monopoly. There are patents constantly being issued for telephones and improvements on the telephone system. To give an example of the activity of inventors in this one branch of electrical science, it is only necessary to state that there were in one month 234 patents issued for magnetic telephones, and 500 patents for microphones.

This tremendous outflow of patents shows that it requires a very careful analysis of the various electrical contrivances to decide their priority or their value.

It is a prolific source of revenue for the Patent Office, and the stimulus to investigation is increased by the enormous profits accruing to those whose inventions have proved of practical value.

There appears to be nothing discouraging to inventive genius in this field, as the applications of electricity and magnetism are innumerable and apparently inexhaustible; the blessings already secured by mankind in the transmission of intelligence and the applications of a new power, are but the shadows on the screen of the present of the beckoning finger of the future.

A Foreign Fake.

A reader of THE INVENTIVE AGE calls attention to a foreign humbug as follows:

I write you for the benefit of your many readers, as I observe you are willing to expose frauds. I desire to refer to the company called "The International Patentees Agency of 106-7-8, Victoria Chambers, London, England. I have had dealings with them and am prepared to say that they are frauds. I now have in my desk a letter from our secretary of the embassy at London, dated January 7, 1895, asking me to warn my friends of this fraudulent firm or agency. Our secretary also advises me that the Postmaster General of the United States has recently directed the postmasters at Boston, Baltimore, New York and Philadelphia to return to the senders all registered letters addressed to this agency, and to refuse to certify international postal money orders payable to them on the ground that they are operating a fraudulent scheme through the mails.

Revision of the Patent Laws.

The American Bar Association has undertaken the task of revising the Patent Law, and a sub-committee, consisting of Messrs. Edward Wetmore, of N. Y.; J. H. Raymond, of Chicago; C. E. Mitchell, of Conn.; F. P. Fish, of Boston; Judge Taylor, of Fort Wayne, and C. E. Foster, of Washington, has been appointed to perfect needed reforms. When the wolves hold counsel, the lambs need to look out. The composition of this committee guarantees that in their recommendations the lawyers' interests will be looked after. There is no question but that the law ought to be amended, but the points of amendment for the interest of inventors are not so numerous as the agitators pretend to think. The main thing which is needed is to facilitate litigation, to make it easier for the inventor and harder for the infringer. The longest step in that direction would be taken if the decisions of the Commissioner of Patents as to patentability was made *res judicata*, so far as the record of the Patent Office is concerned. As the matter stands now, the whole action of the Patent Office is made reviewable by any United States Judge who may never have seen a patent and who may be as destitute of information on the subject as a Mexican dog's back is of hair. It is safe to say the lawyers will not recommend any measure which will lessen their opportunities in defense of the infringer, and so we say, confusion to 'em.—*Power and Transmission.*

Books and Magazines.

Marietta Holley, "Josiah Allen's Wife," contributes a bright and breezy sketch to the April Arena, called "Beyond the Shadows."

* * *

The second and completing volume of the Funk & Wagnall's Standard Dictionary of the English Language is out and one of the greatest works in lexicography ever undertaken is now on the market. The two large volumes represent over five years labor by over 250 specialists and scholars of eminent ability and learning, and an expenditure of over $960,000. This work is so complete in details that it will take the place of both dictionary and encyclopedia of universal knowledge in every library and in the office of every business man, professor or student. This dictionary will be sold only by subscription. It is published also in a single volume by Funk & Wagnalls Company, New York, London and Toronto.

* * *

Part six of "The Book of the Fair" is even more interesting, and the illustrations more magnificent and lifelike than the previous numbers. This great work of art goes minutely into the details of the great exhibit. The beauty of the buildings themselves, the landscape effects and water views have been shown in many forms, but what of the treasures of art, of science, of industry that filled these palaces to overflowing. The study of such a stupendous collection is of itself a liberal education. There is but one work which illustrates and describes the wonderful exhibits. It has been in course of preparation for nearly two years, and is the most magnificently illustrated work ever issued in America. The title is "The Book of the Fair," 2,500 copperplate engravings, 1,000 beautiful pages. Text by Hubert Howe Bancroft. In is published in twenty-five parts at $1 each. An illustrated pamphlet will be mailed free on application to the Bancroft Company, 30 Auditorium building, Chicago.

* * *

Maxim, the much talked of inventor of flying machines and automatic machine guns, is presented in a new light in Cassier's Magazine for April, an excellent portrait of him being used as a frontispiece and a mass of new illustrations of some of his many inventions being given.

For the Interest of the Inventor.

THE INVENTIVE AGE is in receipt of the following letter from one of the leading mechanical engineers, model and pattern makers in the country, whose dealings and relations with inventors entitles his observations to more than ordinary consideration:

"We beg to acknowledge receipt of the sample pages of THE INVENTIVE AGE. We think you are doing more for the inventor today than any other journal we know of. We will do all we can to help you and your business along, because you are helping to save the inventor's money for them, and they are then able to pay their honest debts for labor and material put in their inventions, and if the work is kept up it will only be a matter of time until an inventor can step out and have work done same as any other man, without having to put up every dollar for the work in advance. Half of the business men look on the inventor as a "dead beat," because he starts out all right and about the time he contracts a bill that he should and would pay, some shark steps in and robs him and he is not able to meet his honest bills and no one wants to trust him."

A German patent has just been granted to Ida Ouaglio, of Berlin, for a method of coloring aluminum. The objects made from aluminum are first covered with zinc, and then colored black by a solution of either platinum, copper, nickel or antimony. To protect the designs a varnish is employed.

Names of Patent Solicitors.

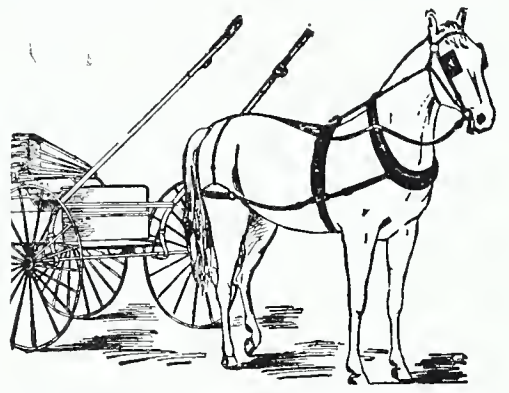
Names and addresses of attorneys practicing before the United States Patent Office, carefully compiled by Virginia W Middleton, for sale by the INVENTIVE AGE; cloth $1.50; paper $1 Edition limited.

The Norwood Automatic Harness.

Any invention that is both a saving of time and labor for man, besides being a clever and humane appliance for his horse, is certain to rivet attention at once. Such an invention is the Norwood Automatic Shaft and Harness Attachment, which upon investigation proves to any intelligent, progressive man its worth, both to himself and his most faithful animal friend.

The Automatic Shaft and Harness Attachment is the invention of Mr. J. E. Norwood, of the Norwood Manufacturing Co., of Baltimore, one of the most reliable manufacturers of the city, and though having been on the market but a comparatively short time, its numerous sales and orders, together with constant enquiries concerning it from all parts of the United States and Canada, are sufficient endorsements of its practical merits.

The attachments are suitable for all classes of vehicles, using single harness with either breast-strap or collars, with or without breeching, and can be converted with double harness instantly. The single tree, traces, shaft tugs and many leather



bands and straps upon the shafts are all removed, giving the shaft a clean appearance, and reducing the harnessing and "hitching up" to a mere moment's work.

Freedom from sore back or bruised shoulders of the horse is insured, with no rubbing of the sides. The wear and tear of the harness is reduced thirty per cent, and the horse can be detached instantly.

Many attempts have been made to dispense with the singletree and traces, but no invention before has ever proved practical. The shaft attachments are a pair of pressed steel sleeves placed on the ends of the shafts, in which are steel springs 14x20 inches long of varied weight and strength suitable to the size and style of the vehicle used. The springs are held forward by means of a hexagon tap which screws onto a bolt with threaded head secured to the spring. The other end of the spring is secured to a lock by means of a neck pressing through a slot in the sleeve. The lock is fitted to the sleeve at a point where the tug usually works. The harness is centered at the same point by means of a four-sided buckle having a shoe-like key to fit the lock. The lock is provided with a small trigger placed under the shaft, with a fender to prevent it from being accidently released. By an easy pull of this trigger the horse is instantly unhitched.

The invention is a remarkable improvement on the old time harness and shafts, and one of its best points is its great immunity of the horse. The bearing on his back being removed, the vital organs are thus released from unnatural pressure, and his breathing is normal.

Largest Fire Engine in the World.

The city of Hartford has the largest fire engine in the world. It is of the Amoskeeg type, is ten feet high, over seventeen feet long, weighs nearly nine tons and dischages 1,300 gallons of water per minute. It is capable of throwing a horizontal stream of water 348 feet, using fifty feet of hose and throws two streams of ordinary size a distance of 300 feet. The machine is propelled by steam power. When in the house the boiler is connected with steam pipes from a heater in the basement, and steam is always kept up to about ninety-five pounds, which would run her about a quarter of a mile. The fire box is kept full of material ready for lighting, and a steel arm under the engine carries a quantity of waste saturated with kerosene oil, in close proximity to a card of matches in a holder under a scratcher, the latter being attached to a cord tied to a ring in the floor. At an alarm of fire the steam pipes are disconnected, the throttle opened, and before the engine has moved six inches the cord pulls the scratcher, and the rod carrying the blazing waste swings around under the fire box, igniting the shavings and wood. Steam enough can be generated in two minuses to run the engine at a speed of thirty-one miles an hour.

It is estimated that over 4,000,000 incandescent electric lamps were used in the United States last year.

Advertisements inserted in this column for 20 cents a line (about 7 words) each insertion. Every new subscriber sending $1.00 to THE INVENTIVE AGE will be entitled to the AGE one year and to five lines three times FREE. Additional lines or insertions at regular rates.

FOR SALE.—U. S. patent, No. 515,792, and Canadian patent, No. 45,700. Adjustable Door Fender. A simple, practical and inexpensive article to manufacture. Will sell entire or state rights or royalty. Ira A. Ritz, Nobscot, Mass. 4-1

FOR SALE.—Patent No. 493,115; Time Lock. Will sell state rights or United States at reasonable prices. Lock can be applied to any common safe door. Locks for five minutes or for seven days. For any information address N. B. Reis, Lincoln, Kans. 4-7

FOR SALE.—Something good—Mowing Machine Knife Bar. This bar is so arranged as to hold the knives and Pitman eye with one bolt. For particulars address Z. E. Wiseman, Vadis, Lewis Co., W. Va. 4-7

FOR SALE.—A valuable patent on corn planting machinery, No. 527,160. Fits nearly all planters. Splendid to work by agents. Will sell or place on royalty with bonus. Address quickly, Leroy Runyan, Iola, Kans. 4-7

FOR SALE.—A valuable patent, No. 506,545. A Combined Sewing Stand and Ironing Board, a very useful piece of furniture. A chance for agents and manufacturers to make good interest on their money. Address, Mrs. Martha Reck, Union Bridge, Md. 3-5

FOR SALE.—I will sell outright, or on royalty, my valuable patent, No. 521,568, Burial Case or Vault for Graves. Manufactured from fire clay or other suitable material. Address, Jas. F. Hobson, New Antioch, Ohio. 3-5

FOR SALE.—I will sell outright, or on royalty, my valuable patent Pipe Wrench in Canada and England. It is superior to any in use and can be cheaply constructed. Address, James A. Smith, Cleavesville, Mo. 3-5

FOR SALE.—My patent, No. 513,542, and also an additional patent allowed but not issued, "An improvement in Tinners Hand Shears or Snips." Will sell on reasonable terms. Address, Geo. H. Stockman, 3510 N. 17th street, Philadelphia, Pa. 3-6

FOR SALE.—My patent Ratchet, the best time saving device ever invented. Will sell at a reasonable figure. For particulars address, O. Smith, 415 York ave., Philadelphia, Pa. 2-4

FOR SALE.—Or on royalty patent No. 532,151, Door Prop or Bolt. Holds the door open at any point and will bolt it when shut. Also best bosom board made. L. Funk, Waynesburg, Pa. 4-3

FOR SALE.—Or trade, patent No. 477,246, Washing Machine. Has stood practical use. Am not able to give it attention on account of poor health. A bonanza for right party. T. D. C., Box 43, Boyleston, Ind. 4-7

FOR SALE.—One-half interest of territorial rights of patent No. 432,592. A device for dressing or cutting mill stones. Address, Simon P. Bacaston, Sand Beach, Pa. 4-7

FOR SALE.—Patent No. 531,533; Dinner Pail. Containing Lantern, Food, Drink and Hand Warmer, with boiling cup attachment. Will sell on royalty. Address, Henry M. Holmes, Ayer, Mass. 2-4

FOR SALE.—A valuable patent, No. 506,910; Attachment for Vehicles; big money in it. Gold Medal Awarded on the Machine, October, 1894, at the Mt. Holly Fair. Send three 2-cent stamps for photograph. Address, J. E. Haines, Medford, N. H. 2-4

FOR SALE.—State rights on process of casting and tempering pure copper, simple and cheap as brass founding; solid and tough castings guaranteed; unsurpassed for electric purposes. Name location wanted. T. D. Bottome, Indianapolis, Ind. 2-4

FOR SALE.—Patent No. 454,254, on toy belonging to the "puzzle" family. A fine opportunity for some person or novelty manufacturer. Only $200 and royalty if taken at once. Max Cohn, 828 Vliet St., Milwaukee, Wis.

FOR SALE.—Patent No. 524,279; Rocking Chair. Enables occupant, through easy push on the rocking foot or arm rest, to swing and rock combined; adjustable parts. State and county rights for sale. Address, John Koltmann, Jeannette, Pa, 2-5

FOR SALE.—Outright, or State right, my two U. S. patents, Nos. 445,929 and 503,564, for "Shaft Tugs." If I can sell or lease whole business, will let the tooles for making the goods go with patent. Address, E. L. Carlton, Selma, Clark Co., Ohio. 3-5

FOR SALE.—A valuable invention; Patent Seed and Grain Cleaner. Will sell the territory of several of the eastern states. Address, Jos. W. Henry, 504 American Bank Bldg., Kansas City, Mo. 3-5

FOR SALE.—Patent No. 525,225; Gravity Door Lock. Has no springs, Easy working, cheapest and most durable. Address, B. S. Miles, Gray Summit, Mo. 2-7

FOR SALE.—County and State rights, Johnston's Storm Sash and Outside Shutter Fastener. Address, J. D. Johnston, Newport, R. I. 1-4

FOR SALE.—Patent No. 436,183, Glass Plant Protector; frost proof; produces melon and all other vegetables twenty days earlier than in the open air. Will sell out right or on royalty. Testimonials on application. Address, John Holder, Morley, Scott Co., Mo. 3-5

FOR SALE.—A Patent Furniture Castor to prevent insects of all kinds from infesting furniture. It is one of the best things on the market. Does not infringe another patent. Address, Jonathan Elwood, Sanger, Cal. 3-5

BUSINESS SPECIALS.

Advertisements under this heading 20 cents a line each insertion—seven words to the line. Parties desiring to purchase valuable patents or wanting to manufacture patented articles will find this a valuable advertising medium.

WANTED.—To manufacture on royalty or purchase half interest in valuable patent that is in immediate demand. J. H. Snow & Co., Indianapolis, Ind. 3-5

WANTED.—Having invented several successful machines, I offer my services to anyone wishing to have an improvement made on any kind of machinery for a reasonable compensation, and if I fail I ask nothing. Address, Wm. E. Pleasants, La Junta, Col. 4-6

WANTED.—Some manufactures to make and sell my one process cider mill on royalty. Address, Wm. E. Pleasants, La Junta, Col. 4-6

WANTED.—Inventions of merit and in big demand to manufacture on royalty. Send model, specification, and state what you want on your invention. G. W. McCook, 720 Olive Street, St. Louis, Mo. 4-

WANTED.—Some articles to manufacture that will pay thirty per cent on the investment and will not require over five thousand dollars to put on the market. Address, S. Z. Starr, Drawer U, Indianapolis, Ind. 4-7

WANTED.—An agency to purchase or promote the interests of a good and meritorious invention. Address, with descriptive particulars, H. S. Hampton, Box 223, Lima, O. 3-5

WANTED.—An experienced salesman to sell my new patent. A preventative against train or bank robbery. For particulars, address, Silas E. White, Watertown, N. Y. 2-5

WANTED.—Manufacturers or capitalist who wish to pay all expenses for an interest in the patent for a meritorious invention to be patented. Address, George C. Stanton, New Iberia, La. Correspondence solicited. 3tf

ARE YOU a wide-a-wake manufactnrer looking for new and practical patents in your line? If so, address at once G. Lanbe, Inventor and Patent Salesman, Huron, South Dakota. 2-4

Electric Flashes.

The rumor is current that negotiations are pending looking to an agreement ending all litigation between the General Electric and Westinghouse interests.

The branch of the New York Central railway, between Buffalo and Niagara Falls, will be equipped with a trolley system. The experiment will have great bearing on the future of electricity in the direction of motive power for railways.

According to a recent lecture of Prof. Schuster, of London, the safest course for a human being in a thunderstorm is to get thoroughly wet. Benjamin Franklin remarked that he could kill a rat when dry by means of an electric discharge, but never when it is wet.

Our German cousins have been investigating the effect of the mass of telephone wires in cities upon atmospheric electricity—whether or not there was increased danger from lightning. The result has been to show there was less severity in the thunder storms and less liability to bring strokes of lightning than in cities where there were no wires. The occurrence of lightning in towns whose streets were strewn with wires was found to be only one-fourth as often as in places where no telephone or other wires existed. The presence of wires is not such a menace in this respect as has been feared, and we are glad to record a prospect of a modification of public opinion on one point at least.

A Springfield, Ohio, man has invented a device for doing away with the dangerous "live" wire, which is the most serious drawback to the electric railway system when a break occurs. It is a new form of hanger to suspend the trolley wire from the cross wire between the poles. It is designed to divide the wire into sections as long as the distance between the poles, instead of having it in sections of a mile in length, as is the case with most electric lines now. The wire is broken at each hanger, and the device receives the end at each side, the electric connection being made through the hanger itself, which is of copper and a good conductor. The trolley wire is thus divided up into sections, which are about 125 feet in length and have no connection with each other, except through the hanger. The wire is so connected with the hanger that in case there is any break, or it becomes loose from the hanger at the other end of the section, it is detached automatically, breaking the electric connection and rendering the strip, which falls to the ground harmless instead of a deadly instrument.

Aftermath.

A RECENT reported gold find in South Africa will supply the world with gold. It is said that there is a mountain of almost native gold in the find.

HENRY VILLARD is expected to arrive from Europe about April 15th, and it is rumored he is endeavoring to again obtain control of the Northern Pacific railway.

THERE are signs of industrial and commercial improvement. Increased clearings and advanced money rates at money centers and increased activity in manufacturing centers are but the forerunners of at least an improvement.

THE Bureau of Immigration statement shows that the total number of imigrants arriving in the United States for the past seven months ending February 1st to be 113,375, as against 189,582 for the same period in 1894. A decrease of 40 per cent.

THE Court of Appeals, after long litigation, has sustained the Commissioner of Patents in his refusal to give Caleb W. Dunham, of New York, a patent for a system of drain pipes to be used in residences. It was an important case in which the inventor was represented by able counsel, including Don M. Dickinson, of Michigan, and J. Nata McGill, of Washington.

IN the case of the Westinghouse Air Brake Company, of Pittsburg, against the Boyden Power Brake Company, of Baltimore, recently decided in the United States Court in Baltimore, a decision was rendered in favor of the Westinghouse Company. The Boyden Company, it is understood, has spent over a quarter of a million of dollars in developing its brake, which is used on 50 or 60 different railroads.

A COMMITTEE from the Massachusetts legislature visited Washington recently to witness the test of the Claude street car fender on the Chevy Chase line. The invention is a double arragement, consisting of a steel chain basket attached to the front of the car, with a rubber-covered pliable steel spring, which strikes the object if standing and throws it into the basket. A dummy was used for the experiment, and after falling into the basket, seemed to ride as easily as if in a hammock. The second fender is placed directly in front of the wheels of the truck.

THE following promotions in the Patent Office have been made, based on the vacancies among the principal examiners, caused by the death of Franklin A. Seely and the promotions of John H. Brickenstein and Arthur P. Greeley to be examiners in chief: James T. Newton, of Thomaston, Ga., from chief clerk at $2,250 to principal examiner at $2,500, vice Seely. Also the following promotions in the examining corps: Edwin S. Henry, of Kansas, and Arthur F. Kinnan, of Texas, second to first assistant examiners, $1,600 to $1,800; Charles F. Chisholm of New York, Arthur W. Cowles of Connecticut and Elida C. Hough, of New York, third to second assistant examiners, $1,400 to $1,600; William E. Schoenborn, of New Jersey, John H. McElroy, of Illinois, and Edward H. Eakle, of Colorado, fourth to third assistant examiners, $1,200 to $1,400. The following appointments have been made: Wallace W. Hite, of New Mexico, chief of draughting division, at $2,000, vice James B. Bocock, deceased. Appointed through the civil service commission: William F. Burleigh, of Massachusetts, Emerson F. Newell, of Connecticut, and Jesse M. Woodward, of Kentucky, fourth assistant examiners, at $1,200; Mark Randles, of New York, Ellsworth Hibbs, of Ohio, Scudday J. Richardson, of Wisconsin, and Montford M. Mendenhall, of Oregon, copyists, at $720.

Chief Examiners Resign.

The profession of patent attorneys and the inventors having business before the U. S. Patent Office will regret the resignation, on the first of April, of H. H. Bates and Rufus L. B. Clarke, who have served on the Board of Appeals in the U. S. Patent Office for many years. The requirements of Sec. 482 of the Revised Statutes are:

"The examiners in chief shall be persons of competent legal knowledge and scientific ability, whose duty it shall be, on the petition of the appellant, to revise and determine upon the validity of the adverse decisions of examiners upon applications for patents, and for reissues of patents, and in interference cases."

Judge Clarke was appointed by President Grant in 1869, and Judge Bates in 1877 by President Hayes. During their term of office they decided 18,000 cases involving the most complex questions of law and science, and it may be truthfully said that there never was more justice, equity and fairness ever dispensed from a court. Their sympathies were always with the inventor, and they invariable resolved the doubt in his favor, looking at his claim in the light of practical men, appreciating his struggles, and the commercial importance of his invention. Judge Clarke retires from active professional life, but Judge Bates will engage in the practice of patent law at Washington, D. C.

"BUBIER'S POPULAR ELECTRICIAN" is the name of a monthly publication which contains a vast amount of valuable information on all electrical subjects. Its department of "Questions and Answers" will be appreciated by students and amateurs desiring information or instruction on any problem that may arise. THE INVENTIVE AGE has made special arrangement whereby we can supply that popular dollar journal and THE INVENTIVE AGE—both publications one year—for $1.50.

INVENTIVE AGE BUILDING.

PREMIUMS TO SUBSCRIBERS.

Read the following offers to new subscribers:

OUR $1 OFFER.

THE INVENTIVE AGE one year and two copies of any patent desired, or one copy of any two patents..... $1 00

THE INVENTIVE AGE one year and a list of 50 firms who manufacture and sell patented articles..... 1 00

THE INVENTIVE AGE one year and Altograph map of the City of Washington 1 00

THE INVENTIVE AGE one year and a five line (35 words), advertisement in our "Patents For Sale," or "Want" column, three times..... 1 00

For $1.

THE INVENTIVE AGE and any one of the following Scientific books:

How to Make Electric Batteries at Home, fully illustrated, by Edward Trevert.

Everybody's Handbook of Electricity, illustrated, by Trevert.

How to Make a Dynamo, by Trevert.

Practical Directions for Electric Bell Fitting and Electric Gas Lighting, by Trevert.

Elihu Thompson's What is Electricity?

OUR $1.35 OFFER.

THE INVENTIVE AGE one year and Joseph Allen Minturn's famous book "The Inventor's Friend," indorsed by such high authorities, as Dr. Gatling, Clem Studebaker and others,.....$1.35
Book alone 50 cents.

THE INVENTIVE AGE one year and any one of the popular and instructive books as per offer in another column, under heading of "Popular Scientific Books."..... $1.35

THE INVENTIVE AGE one year and any one of the "Excelsior Edition of Standard Poets," mentioned elsewhere in this magazine,..... $1.35

THE INVENTIVE AGE one year and a copy of "Picturesque Washington," 260 pp., 136 illustrations, Stilson Hutchins' famous book, former price $2, sent to any address in the United States..... $1 35

THE INVENTIVE AGE one year and The Peoples' Atlas of the World, one of greatest bargains ever heard of; size of Atlas 14 x 22 open; latest maps and statistics; handsomely illustrated, a $2 book with AGE one year—both for.... $1 35

☞ See another column for other offers.

OUR $1.50 OFFER.

THE INVENTIVE AGE one year and Robt. Grimshaw's famous book "Tips to Inventors"..... $1 50

Address all communications to
THE INVENTIVE AGE,
Washington, D. C.

Information Wanted.

Patent Centennial Celebration, held in Washington April, 1891. The Executive Committee desires the addresses of the following named persons who are entitled to the printed report:

Hugh M. Browne, Jas. A. Burden, Jno. S. Boneville, J. Lawrence Butler, John A. Brill, G. R. Blodgett, Geo. Burnham, Jno. Christensen, F. E. Chander & Co., W. H. H. Judson, F. M. Chogwill, D. H. Carpenter, A. L. Chermont, Philip Diehl, M. F. Davis, Moriss Feilbogen, J. W. Hyatt, Rafael Mullin, W. H. Miller, Edward Nevitt, D. G. Ormsby, N. G. M. Perrin, Jose Rde Rivas Y Rivers, E. H. Reeves, Samuel Riley, Geo. B. Selden, H. F. Slocum, David M. Smyth, Shoemaker Co., John Truesdale, Joseph Wirth, N. G. Williams, M. A. White, E. O. Young.

The "Proceedings and Addresses," a book of 550 pages, for sale at $5. The price of copies remaining unsold June 1, 1895, will be advanced to $7. Geo. C. Maynard, chairman, 800 H street, N. W., Washington, D. C.

March 15, 1895.

"Tips to Inventors."

This is one of the most instructive and useful works for mechanics and inventors. Its author is Robert Grimshaw, M. E., and the book, cloth bound, retails for $1. THE INVENTIVE AGE for one year and "Tips to Inventors" will be sent to any address for $1.50

A CLASSIFIED list of Patents issued during the month appears in each issue of the INVENTIVE AGE, which keeps inventors posted in the art in which they are mostly interested. —— The full address of any patentee, and number of patent found below sent to any address on receipt of one 2-cent stamp. —— We will send, postpaid, to any address, printed copies of any U. S. patents, with specifications and drawings, upon receipt of 20 cents for one copy; 35 cents for two copies; 50 cents for three copies. —— (See premium offer elsewhere in this issue.) —— Address THE INVENTIVE AGE, 8TH AND H STS., WASHINGTON, D. C

LIST OF PATENTS

GRANTED FOR INVENTIONS,
FEBRUARY 26, 1895.

Addressing newspapers, etc., device for. J Burrows.
Advertising device. F A Miller.
Advertising device. E Walker.
Air brake pump and apparatus. N A Christensen.
Air compressor regulator. J Clayton.
Alarm check and guard, automatic. A F Carpenter.
Ale drawing device. C G Reers.
Apples in barrels, device for packing. S N Hathaway
Atomizer. A Heinz.
Axle for carriages, ball bearing. G W Pomroy and C A Hatch.
Axle, vehicle. S O Wilson.

Bag machine. W H Kerr.
Baking pan. R H Ingraham.
Bearing, antifriction. O B Johnson.
Bed, couch. W Fricke.
Bell cord support. P G Emery.
Bell, indicating door. J M Davis.
Belt guide. M G Ring.
Bicycle. F H Bolte.
Bicycles, supporting clip for brake arms of. F J Stimson.
Binder, temporary. E Marble.
Bobbins, presser cone point for. G W Snyder.
Boiler. M Mahony.
Boiler W Schmidt.
Boilers and removing impurities therefrom, device for circulating water of. S J Wilford.
Boot treeing machine. C W Clark.
Boring machine. A S Hoge.
Bottle cap 2. W H Northall.
Bottle neck threading and finishing implement. R Good, Jr.
Box making machine. A C Hackley.
Brake beam. H C Buhoup.
Brick mold sanding machine. E Gorman.
Bridge, draw. B L Worden.
Bridle blind. A E Loveless.
Buggy top support. F M McMahon.
Bung, faucet. D Beebe.

Calendar, perpetual. R H Bullock and W G Fairchild.
Calendar, perpetual. H S Stevens.
Candy mold, flexible 2. W E Coleman.
Cant hook. H O Thomas.
Car brake, railway. S Kreisher.
Car brake, railway. T Millen.
Car coupling. M H Cooke.
Car coupling. J S Cornish.
Car coupling. C Mire and J Judice, Jr.
Car coupling. H C Morton.
Car coupling. C Palmer.
Car coupling. J C Taylor.
Car door. T C Allen.
Car fender. S Essex.
Car fender. H Phinney.
Car fender. A J Thornley.
Car propulsion, compressed air motor for street. W Creely.
Car, railway sleeping. H Pearson.
Car, sleeping. L T Bradstreet.
Car switches, mechanism for operating street. A C McKenzie.
Car wheel. E A Sperry.
Car wheel. W J Willits.
Carbonaceous materials, process of artificial crystalline. E G Acheson. (Reissue.)
Carbonating liquids, process of and apparatus for. E Adams.
Carburetor. H B Cornish.
Card grinding, top flat. H McDermott.
Card holder, price. J Kochler,
Cards, sewing machine for lacing together Jacquard. R Reid, J Fisher and J Parkinson.
Carriage. H E Wilford and J T Clarkson.
Carriage top spring. W W Krutsch.
Cars, driving mechanism for dynamos located on railway W L Bliss.
Cart, dumping, G M Pratt.
Cash register. J Miller and C D McLean.
Casting projectiles. J A Potter.
Chain for personal ware, safety. C R Bates.
Cheese factories, measuring mechanism for. C L Shearer.
Cheese press. F C Stecker.
Churn. M F Kelly and H A Hagqnist.
Clipper, hair. J K Stewart.
Cloth notching machine. H B Allyn.
Cloth stretching machine. D R Kinyon.
Clothes hanging device. H E Graham.
Clutch. H Stanley.
Clutch, friction. G N De Lorica and F W Wilder.
Clutch, shaft. E A Sperry.
Coat supporter. J A Stall
Cock, stop. F H Cullen.
Combination lock, electrically actuated. S L G Knox.
Commutator. D P Thomson.
Compress, eydraulic. A H Simms and W M Fulton.
Concentrator and amalgamator for precious metals. H Baudouin and J Southern.
Conveyer, endless. A J B Berger.
Cooker, steam. W M Coventry.
Copying pads, composition for manifold. E G Saltmann.
Corset fastening device, locking device for. S J Root.
Couch and divan, combined. F P Wilson.
Culinary vessel or apparatus. J F McLean.
Cultivator. H S Overstreet.
Cultivators, harrow attachment for wheel. W S Elliott and C A Barnes.

Damper. G C Oscar.
Darning apparatus W A R Aird.
Dental engine. H C Register.
Detergent compounds, making. F E Coulter.
Diamond polishing tool. L Dreyfus.
Dike. R H F and N W Sewall.
Distillation apparatus. P A Mallet and T A Paguiez.
Distilling apparatus, ammonia. S J Whiteside.
Door hanger 2. J T McCabe.
Door securing. W C Hillgendorf.
Draft attachment. W E Harmon and J L Garwood.
Draft attachment, doubletree. W E Harmon and J L Garwood.
Drafting board. T F Dolen.
Drafting instrument. H W Harrison and L B Wadleigh.
Dredging machine. A W von Schmidt.
Drills, means for operating. E Thomson.
Dust pan. K W Gress.
Duster. F Nelsen.
Dye, blue. J Bierer
Dyeing machine. T R Houseman.

Egg case. H M Childs.
Egg case cushion. E W Hargiss.
Electric brake 2 E A Sperry.
Electric conductor connector. R D Titcomb.
Electric current transformer. J A G Trudeau.
Electric machine, dynamo. R Eickemeyer.
Electric resistance card. A J Shaw.
Electrically propelled mechanism, apparatus for arresting motion of. E A Sperry.
Electrodeposit, manufacture of articles by. H S Anderson.
Elevator. T W Barber.
Elevator. J C Kailey.
Elevator automatic stop device. H R Smith.
Emery wheels, composition for. E E Fowle, L G Clarey and E H Coolidge.
End gate, wagon. D E Lantz.
Engines, distributing motion for double or multiple water pressure. E Kaselowsky.
Engines, electrical lighting device for gas. C L Ives.
Envelope. S Gabriel.
Excavating machine. C A Smith.
Exhibitor, carpet. O A Knox and F Franey.
Eyeglasses. L L Mincer.

Fabrics, apparatus for stretching and drying tubular. H A Tullar.
Feed water heater. A Burlingame.
Fence. D M Crumley.
Fence, J Hack.
Fence machine, wire. C M Lamb.
Fence post. T A Galt.
Fertilizer distributor attachment for carts. F P Bond
File for back orders, bills, letters, etc. F W Adams.
Fire alarm telegraph system. C A Rolfe.
Fire proof floor and ceiling. P M Brunner.
Fish hook. C Kienle.
Fish hook guard B F Burgess.
Floor cloth seasoning. F Walton.
Flue cleaner. C F Thomas.
Foot wear. C L Higgins.
Fracture apparatus. S C Robbins.
Fruit grader. A Cerruti
Fur plucking machine. I Dresdner.

Gang trimmer. W A Wilkinson.
Garment supporting clasp. J F Atwood.
Gas fixture. L H Stoddard.
Gearing, trammel. F R Goode.
Glass blowing apparatus. M J Owens.
Glass mold. R Good, Jr.
Glue cutting machine. D Jarvis.
Gun barrels with stocks, detachably uniting. L L Hepburn.
Gun, magazine. J Laumann.

Harrow. H P Deuscher.
Harvester. A W Sternke.
Harvester, corn. C A and H A Low and A M Messenger.
Hitching device. J Cunningham
Horse rake. G N Caraway and O M J Ramsey.
Horseshoe, heel padded. J B Buengers.
Hose reel. A A Spadone.
Hose reel attachment. A A Spadone.
Hub attaching device. R B Liddell.
Hydraulic motor, rotary. S J Tutthill.
Hydraulic power motor. J M Allen and A J Welcker.
Hydrocarbon burner. H W Parker.

Ice machine condenser. D L Cook and F C Pickrell.
Incandescent light H F Rooney.
Insect catcher and destroyer. L J Sevison.
Insulated electrical conductors, apparatus for manufacture of. L W Downes.
Insulated electrical conductors, method of and apparatus for. L W Downes.
Iron or steel, making. M R Conley.

Jar or bottle cover and fastener. J L and E A De Steiger.

Keg register, electrically operated. J Knff.
Knife linings, making. E and F Linder.
Knitting machine. H Pulster.
Knockdown fancy box. H J Erkenswick.
Knot trimmer. N Johnstou.

Lacing hooks, making covered. M N Bray.
Ladder chair. G W Darby.
Ladders, support for traveling hangers for step. J T McCabe.
Lamp. H E Keeler and W S Hamm.
Lamp burner. D T Fox
Lamp, electric arc. J Brockie.
Lamp, electric arc. H O Swoboda.
Lamp standard. T Flynn and H O Norton.
Last. F E Benton.
Lrten and check, combined 3. R Wright.
Lathe tapering attachment. J Richards.
Lever mechanism. L H Depuer.
Liquid raising apparatus. F H Merrill.
Liquid raising apparatus and process. F H Merrill.
Loom stop motion. E J Ashley.

Magnetic leakage, method of and means for preventing. E Thomson.
Match safe and cigar cutter, combined. F C Lndlow.
Mattresses and making same, woven wire. M L Cross and W S Seymonr.
Measuring and winding machine, cloth. C H Weaver.
Mechanical movement. T R Houseman.
Metal planing machine attachment. T W Green.
Metal working apparatus, electric. H Lemp.
Metals, joining. F G Stark.
Mincing knife. N R Streeter.
Miter box, adjustable panel. T Harold.
Molding flask. J Byrnes
Motor. S Bean,
Motor. W W French.
Movement cure apparatus. H Krukenberg.
Mower, lawn. W T Armstrong.
Mowing machine cutter attachment. W C Carlton and C H Sebree.
Musical instrument valve. O Spaethe.

Nautical observations, instrument for taking. W H Beehler. (Reissue.)
Nut lock. H Bezer.
Nut lock. W A Hanvey.

Oil can. W N Green.
Oil can. F B Smith.
Oil heater. J Jauch.
Oven, baker's. G Thom.

Padlock. J Roche.
Padlock. E Wagenknecht
Paper feeding device. F Hoyer.
Paper feeding machine. H B Cooley, J M Noble and J E Trevor. (Reissue.)
Paper perforating machine. C W Holmes.
Paper registering machine. T C Dexter.
Pedal attachment. M W Mullen.
Pen, drafting. J L Garner.
Pin holder. R H Bachlott
Pipe joint for plumbing. C J Lennihan.
Pipe protector, discharge. M G Johns.
Pipe threading machine. R P Curtis and J H Riley.
Planter D Broderick.
Plasterer's hawk. J M Davis.
Plastic mass machine for mixing, kneading or otherwise treating. P Pfleiderer.
Platform, portable safety. A Falk.
Plow. A Gray.
Pneumatic tool. J G Carlinet.
Pneumatic tool. H W Metzing.
Polishing or lapping machine. C W Sponsel.
Portiere, rope. G F Hensel.
Power, means for transmitting. J W T Morris.
Pressure controlling device, power. F A Littlefield.
Pressure regulator. A W Cash.
Printing guide, hand. J F Tenney.
Printing surfaces, machine for making. J R Rogers.
Propeller, oscillating, J J Brandt.
Prune picker. A L Bancroft.
Pulley. C W McElroy.
Pulley shell. W R Fox.
Pulverizing, means and mechanism for. W E Downs.
Pump. F Harris.
Pump, air. R F Hall.
Pump, centrifugal. W P De Remer and J Peeper.
Puzzle. A F Sutherland.

Railway carriages, heating and ventilating. S Hughes.
Railway, conduit electric. M F Flynn.
Railway, electric trolley. J M Hammill.
Railway sanding device. C R Howard.
Railway supply system. H F Gray.
Railway switch. J M Perkins.
Railway switch stand. W Rowlands.
Railway switching device. W L Geisler.
Railway system, electric. H A F Peterson.
Railways, automatic danger signal for. H G Lee, J F White, T Ball and J L White.
Railways, battery system for electric. E Julien.
Railways, combined switch, loop, and crossover for. J Davis and W A Thomas.
Railways, underground conduit for electric. H A F Peterson.
Ram and pump, combined hydraulic. G Yellott.
Reel. C S Gooding.
Refrigerator cars, ventilator screen for. G W Jenings and C W Bradley.
Retort lid fastening device. K M Mitchell.
Rock drill. G W Jones.
Rocket holder. H Krucker.

Sales recorder, manual A C Hough.
Sash holder and fastener. S H Shout.
Saw, crosscut. G D Roberts.
Sawmill carriage mill. D B Hanson.
Scale. W H Sargent.
Scale, portable wagon. C C Miller.
Scale, weighing C A Heyer.
Scraper, wheeled. M G Bunnell.
Seal lock. H P and C N Lenhart.
Seat support. H C Ham.
Seed delinting machine, cotton. M Moran.
Seeding machine. K C Haworth.
Seeding machine. L H Kimball.
Sewing machine. J W Lingley.
Sharpener, lawn mower. W A Sweet. Jr.
Shingle sawing machine. F Challonea.
Shoe fastener. A J Waggett.
Sickle bar J Sherrett.
Signal. E H Goodman.
Signals, electric slot for. J P Coleman.
Signaling apparatus, electric. B J Noyes.
Signaling system. C H Brace.
Sole A Sessler.
Sounding board for stringed instruments. V H Mathushek.
Steam boiler. J W Hanghawout.
Steam engine. M C Bullock.
Steam engine 2. M R Moore.
Stoker. D F Graham.
Stove, heating and radiating. J P Lynott
Stove or range. J Ballou.
Stoves, movable lid support for cook. J T Smith.

Tableware, methods of and means for marking and ornamenting. W H Legate.
Tapping mains, machine for. J Hearne and E E Cisco.
Target traps. S Clover.
Target trap releasing device. B O Bush.
Teaching business practice, method of and apparatus for. W H Sadler.
Teeth, regulating. E H Angle.
Telegraph and telephone system 2. C A Rolfe.
Telegraph, printing. S V Fssick.
Ticket case and register, mileage. S I Butters.
Tile and making same. T Polivka.
Time recorder, workmen's. J R Connell.
Tire, pneumatic. J B and J B Dunlop, Jr.
Tire, pneumatic. R P Scott.
Tire, pneumatic wheel. A Pulbrook.
Tires or other rubber goods, manufacturing. F W Hardwick.
Toe calk, detachable. W A Miller.
Track structure. E Samuel.
Tramway and car therefor, coal discharging. J B Honor.
Tripod or camera support. E W Perry, Jr.
Trousers stretcher. C H Ruggles.
Trunk fastener. J B Thieman.

Umbrella folder and holder. C W Cuenther.
Upholstery, attaching device for supporting wires of. J A Staples.

Valve for hose nozzles, shut off. J H Melavin.
Valve gear clutch. G H Helvey.
Vehicle dasher. S R Bailey.
Vehicle seats, child's guard for. P Schwarzmiller.

Wagon. G M Cleland.
Wagon seat E B Winters.
Wagons, protecting plate for gearing of steam road. W Richardson.
Washboard. P J Joecken and A Weiss.
Watch, stem winder. L P Brandt.
Water closet. J H Hamilton.
Water meter piston 2. J C Kelley.
Water motor, rotary. C K Rogers.
Watt meter, recording. W C Fish.
Weather strip. N W Stover.
Weaving, quill or bobbin for silk or other textile. F Stone.
Wheel fender, vehicle. J M Elder.
Wheelwright machine. S C Doane.
Whist apparatus, duplicate. W Sowdon.
Windmill regulator. R F Skinner.
Window screen. C H Shaw.
Wire rod straightening and cutting machine. A Kenworthy.
Woodworking machine. W L Parmelee, C H. Barker and E B Parmelee.

Yarn tube. F C Kennedy and H A Wilbur.

PATENTS GRANTED MAR. 5, '95.

Advertising device. H E Hawes.
Advertising device. J Montagner.
Air, means for compression of. D McGils.
Alarm clock. C T Holman.
Amalgamation, apparatus for treating of gold ores by dry. A F W Partz.
Amalgamation, process of and apparatus for reducing ores by. N Lehnen.
Armature coils, apparatus for winding. H E Heath.
Armature coils, forming. H E Heath.
Armature winding machine. H E Heath
Axle boxes, receptacle for packing for car. H Rogers.

Badge. B S Whitehead.
Basin, set watch. J H Stevens, Jr.
Basin, wash J Kelly.
Basket cover. W R Van Vliet.
Bed, invalid. R Long
Bed pan. C Fischer.
Beer, etc., electrolytic conduit for. L Wagner and J Marr.
Belt tightener. C B Kyson.
Bicycle. L. Sr., and C O Barnes.
Bicycle attachment. N S Goff.
Bicycle crank axle. C E Hadley.
Bicycle front forks, crown piece for. R Perkins.
Bicycle rest. C H Campbell.
Bicycle saddle. R W Perry.
Bicycles, rear wheel adjustment for. F D Owen.
Blast holes, power charger for. J Schlinger.
Blind operator, window. A O Shatsick.
Bottle scoop, salt mouth. W Vincent.
Bottle stopper. W B Stevens.
Brick machine. E Fernholz.
Brick press. T Parker.
Buckle clip. H R Bynum.
Bug catcher, potato. J Donovan.
Burglar alarm for glass doors. J B Gill.
Button. J V Pilcher.
Button. E Turck
Button and necktie holder, combined collar. C S Wilson.

Cradle, dish. A F Baumer.
Cauele, dish or other. A F Baumer.
Car brake, railway. N Lampman.
Car coupling 2. J C Look.
Car coupling. C A Tower. (Reissue.)
Car coupling. C Whitmore.
Car fender and brake mechanism, combined. D H Hill.
Car fender, street. B Hall.
Car lock, freight. O S King.
Car pilot, street. J J Rhine.
Car seat, street. J Krehbiel.
Car starter. T J Gray.
Car wheel. T Shehan.
Cars, automatic protecting fender for city railway. W H Page.
Cardboard cutter. E Saltzkorn and L Nicolai.
Carriage. S H Gage.
Carriage, folding baby. T H Wilcox.
Cash register. E F Spaulding.
Cash register and indicator. W A Dobson.
Catapult. T H Cundy.
Centerboard. A Stover.
Centrifugal apparatus. D Stewart.
Chain securing device. J V Matthews.
Cheese bandage machine. J J Angus.
Chenille, producing. N Albrecht.
Chimney cowl or ventilator. M J Moran.
Chimney holder. G S Trumbore.
Chloroform, obtaining. R Anschutz.
Churn. E P Smith.
Churn. J H Stewart.
Cigar bunch rolling machine. J Bunn, C A Baker and F R Keyes.
Cigar or other case. G Kracker.
Clasp for textile goods. E H Boyden.
Cloth scouring machine. M H Koldrausch.
Clutch operating device. J B Smith.
Coach pad. N Teas.
Coal delivery box. H Kehl.
Cock, gage. M W Sewall.
Coin freed apparatus. R T and J G Glover.
Collar, harness breast. H Price and Q P Watson.
Column pole, etc., metallic. J H Campbell.
Conveyer. W B Comstock.
Cooking and heating apparatus. H G O'Neill.
Cooking utensil. C E R Marsh.
Copying press. C R Walder.
Corn husking machine, green. L S Campbell.
Cultivator. M and A Sattley.
Cultivator, disk. R K Swift.
Curtain stretcher. P A Austin.
Curtain support. N and W Lavigne.
Cutter or trimmer for shades, etc. M Bretherton.
Cutters, device for making. S M Balzer.

Dam, portable. P S Witcher.
Demagnetizing apparatus. C Houlgrave.
Dental cabinet. H W Creelman and J E Byrne.
Dental plate. H H Schuhman.
Discharge pipe for chip casks. B Kotz.
Ditching or road making machine. F L Straw.
Door check. W Gilfillan.
Dook check. L T Velen.
Door or window screen, E Goff.
Dough rolling and molding machine. J Adair.
Dredging machine. W B Pless. (Reissue.)
Drum, heating. W Hammann.
Dry washer. F E McKinley.
Drying kiln. A T Bemis.
Dust collector and separator. M F Gale H E Meadon.
Dye, bluish red azo. A Weinberg.
Dye, brown. A Weinberg.
Dyeing apparatus. J G Haslam.

Eaves trough hanger. J Herrin.
Electric battery. H J Brewer.
Electric cables, drying. C H Rudd.
Electric circuits, method of and apparatus for regulating. J M Bradford.
Electric currents, circuit interrupter for alternating. H N Potter.
Electric heater or rheostat. J H Delany.
Electric motor mounting. E A Sperry.
Elevator lock, safety. J R Hersh.
Elevator safety device. F T Ellithorpe.
Elevators, automatic safety device for. F T Ellithorpe.
Engine for moving yarns in vats. W H Lorimer and J W Birkey.
Engine indicator, steam. M J Wayne.
Envelope. H R Denis.
Exercising device, finger. F E Osterhont.
Extension table. F Ketthans.
Extension table, round N Lattard.

Feathers, machine for weighing and quilting A E Flattick.
Feed box, gravity. G G Powell.
Feed cutter and corn husker, combined. A Rosenthal.
Fence stay, wire. I K Hollinger.
Fence, wire. S E Jackson.
Fence wire fastener. S F Douglass.
Fertilizer distributor. G D Haworth.
Fibrous materials, apparatus for breaking and bleaching. B Cawthorn and J P Cornett.
Fifth wheel. C R Turner.
Filter. T D Peasley.
Filter. J G and S A Sutton.
Fire door, steam operated. D Holoway.
Flagstaff ornament or weather vane, preservative. W Anderson and J Gibbons.
Floor cloth, machine for manufacture of. H W Godfrey, C F Leake and C E Lucas.
Fly frame C Whitaker.
Flood fibering or shredding machine. J L Shute and A Andren.
Fruit picker. W T S Dickey.
Fruit pitter. J L Hall and F H Chase.
Furnace. J W Holaday.
Furnace roof or top. C Martini.
Furniture, knockdown. W Schwartz.
Furniture, measuring and regulating device for adjustable school. F W Hill.

Gage for indicating thickness of paper, etc. L Schopper.
Game apparatus. C M Coen.
Garbage furnace. D Lance.
Gas regulator and meter. M Spitzer.
Gate. A W Kunce.
Glass and making same, wired E Walsh, Jr.
Glazier's tool. G A Rogers.
Grate, dumping. B E Weeks.
Gutter and cornish plate for horticultural buildings, combined. W A Burnham.

Hammock. J Brayshaw.
Hammock. R C Funke.
Hanger for support of centering. P E Dorman and T E Zocher.
Harness. C B Albee and H L Wixson.
Harrow, disk. W H Parlin.
Harvester. W D Markley.
Harvester and husker, corn. A Steiner.
Harvester elevator. M Kane.
Hat securer. H Astrich.
Hay sling S M Jenks.
Heater for use in manufacture of artificial fuel. H S Albrecht.
Hitching device. F K Cole.
Hitching strap. J H Valleau.
Hoisting and conveying device for tramways. F H McDowell and S A Cooney.
Horse starter. T F Logan.
Hub, metal. J M Kroener.
Hydrant. J C Kupferle
Hydraulic press. O W Ketchum.

Injector attachment. N Dodd.
Insulating conduit for electric conductors,

L B Stillwell and C F Scott.

Knitting machine thickening thread mechanism. A Sedmihradsky.
Knob. S P Cooley.
Knob attachment. J J Bailey.

Ladder, fireman's. D Snell.
Lamp W M Harrison.
Lamp, electric arc 2. H P Davis.
Lamp, incandescent electric. F L Fowler.
Lamp support and cut ont, electric. L Johnson.
Last. G E Belcher.
Letter box. E S Butler.
Lid for tea kettles, etc. J P Leggett.
Life preserver and magazine, combined. E Bennett.
Life saving cap A Mendelson.
Lifting jack. W B Boyd.
Light fixture or analogous article. W McElroy and G W Bayley.
Lighting arrester. A Wurts.
Link, spring. H Barber.
Links, die for manufacture of. J Smith.
Linoleum, apparatus for and method bf manufacturing. D N Melvin.
Lock. J S Barney.
Locomotive stand pipe. O H Arner.
Loom picker 2. J and A Muir.
Loom shuttle guard and catcher. C H Wilkinson.
Lubricator. W F Cronin.

Mail bag. W R Gordon.
Mail bag catcher and deliverer. C F Sliger.
Mangle. A R Gustafson.
Mangle, steam. C Striewing.
Match making machine L H Wolfe.
Match scratcher and deliverer, antomatic. C Hanptmann and J Schwarz.
Measuring and drawing instrument. W S Rowell.
Measuring instrument, distance. J L Buford.
Metal plate edges, machine for trimming. J R Sanford.
Metal shapes, machine for cutting. H C Jones.
Milling machine. G W Hadley.
Mitten, catcher's. A Slomka.
Mortar mixing machine. A Oehler.
Mower, lawn. R D Robbins.
Muscle testing machine. C A Day.

Oil burner. E Goodman.
Oil can. E R Deverall.
Oils, process of and apparatus for gasifying hydrocarbon. E Tatham.
Oyster bed. D H Hibbert.

Paper casing. J C A Moritz.
Paper holder. J T Hoyt.
Paper pulp, engine for preparing. P Huber.
Paper winding machine. W R Farnsworth.
Pen, fountain. I Golwer.
Pen, marking or shading. M B Moore.
Pendulum motor. J Gambetta.
Phosphates, making citrate soluble. A R O Pieper.
Phosphates, making tetrabasic. H M Howe and J E Stead.
Piano. G P Bent, M H McChesney and J G Kunze.
Piano touch regulating divice. G H Arthur.
Pill box. M M Dessau.
Pipe coupling. J Anderson.
Pipe hanger. H F Edwards.
Pit furnace. C A Trantwein.
Polariscope. W F C Morsell.
Potato digger. J Hist.
Potato digger. G A Roberts and J Donovan.
Powder distributer. C H Leggett.
Press for pressing composite building mats, fasciues, etc. D Neale.
Pressure gage, recording. C B Bosworth.
Printing press. W M Gerkey and A Mayerhoff.
Propeller blade. T Armstrong.
Propeller, screw. C R Purnell.
Pulley, expansible. C von Riesen.
Pulley, wood. J L Potter.
Pulverizing mills, automatic feed for. W B McPherson
Pump. J O'Neil.
Pump operating mechanism. M Leitch.
Puzzle. S J Eymann.

Railway conduit, electric. W T Dulany, Jr.
Railway head. J Brady, Jr., and H C Spence.
Railway rails from spreading, device to prevent. C Keeler.
Railway signal 2. W P Hall.
Railway switch. S Dilworth and A B Lipsey.
Railway tie. S W Baldwin and W A Sweet.
Railway train signal. A H R Gniley.
Railways, closed conduit for electric. P Murphy.
Railways, contact device for conduit electric. F E Lodetti.
Railways, sectional conductor system for electric. A Rosenholz.
Receiving and breaking table. A R Ferriday.
Refrigerator car. H A Bowen.
Revolving safety device. F B Felton.
Rheostat. A J Shaw.
Rope fastener. A C Warren.
Rotary engine. J West.
Roundabont. F S Baldwin.
Safe jacket, money. F Bernardin and E C Munson.
Safety fender. M J Mick and J Roos.
Sand washer. A Klemm.
Sash bar clasp. W A Burnham.
Sash fastener. J J Alsdorf.
Saw guide. W N Elliott.
Seal and tag, car. F Aldrich.
Seal lock. W L Sebring and W K Edgar.
Seat fastening device. C G Taylor.
Sectional boiler. L Baker.
Seines, hauling. R D Hume.
Sewer flusher, antomatic. P B Donahoo.
Sewing machine feeding mechanism. V Wittc.
Sharpener or cutter, disk. L B Lancaster.
Shutter fastener. L J Ellis.
Sleigh. D S Hall.
Spark arrester. T H Schroder.
Speculum. H M Seybold and A H Stites.
Spike, marine. A Helgesson.
Spindle bearing adjnsting device. W A Chandler.
Spinning and twisting machine separator. G O and G A Draper.
Spinning machine tension mechanism, ring. M E Sullivan.
Spring forming machine S Atkinson.
Stacking apparatus. N Housinger.
Steam boiler 2. M R Moore.
Steam generator. A G Mumford.
Stone, artificial 2. H Gallinowsky.
Straw stacker. F W Robinson.
Sucker rod coupling. W H Downing.
Switch. C S Van Nuis.

Tablet, manifold autographic. W Assheton.
Tap, antifriction adjustable. W R Clark.
Tea kettle. W H Clinton and C W Bowker.
Telegraph and telephone system, combined. C A Shea.
Telephone apparatns. O L Wnllweber.
Telephone transmitter. J and H M Goodman.
Telephone transmitter, battery. W W Jacques.
Telephony. W W Jacques.
Tent. I Mantner.
Testing machine. C E Buzby.
Thill coupling. G Cargin.
Thill coupling. W L Frazer.
Thread cutter and thimble, combined. M R Gray.
Tile, roofing. T A Aldridge.
Timepiece hands, tool for removing. T F Carr and H M Fannin.
Tire for cycles, pneumatic. J W Hall.
Tire, pneumatic. L. Sr., and O S Barnes.
Tire, pneumatic. R W Russ.
Tobacco granulating machine. J Happich and J Yonmans.
Tobacco, method of and apparatus for ordering. C W Schwartz, Jr.
Tool holder and rest therefor. E Rivett.
Toy cannon. S Sparling.
Trace carrier. M A Martin.
Track cleaner. A J Smith.
Transformer. F S Hunting.
Trousers suspender attachment. T S Slaughter, Jr.
Truck, motor. E A Sperry.
Turnbuckle. H T Bartlett and H J Hancock.
Tuyere, forge. P J Fitzsimmons.
Type distributing machine carrier. L K Johnson.
Type writer cabinet. W Horrocks
Type writer machine attachment. C Spiro.

Valve, antomatic air. C F Paige and E P Allen.
Valve, balancing slide. D R Brown.
Vehicle top, foldidg. A Haberling.
Velocipede driving mechanism. J Marty.
Velocipede pedal toe clip. H W Lester.
Veneer jointer and shaper, wood. G H Carlson.
Ventilator. H Doerge.
Vessel, metallic. J R McLaughlin aad T W Martin.
Violin. J Vivier.

Washer. J H Pipher and D Stringfellow.
Watch center wheel and pinion. F H Cortlell.
Water closet bowl. J Kelly.
Water closet flushing rim. W A Kelly.
Water closet valve. L H Williams.
Water distribution. W T Boyd.
Water heater and purifier. H B Gates.
Weeding implement. H W Davis and W J Seiple.
Well packer, anchor. I N Hoadley.
Winding or taping machine. H E Heath.
Windmill. J A Chapman.
Windmill. P A Norberg.
Wire stretcher and tightener. B A Stockin.
Wrist plate hook rod. H A Hewitt.

PATENTS GRANTED MAR. 12, '95

Acetone, apparatus for making. O Porsch.
Acetone, making. O Porsch.
Amalgamator, ore. G A Kennedy.
Antimony and obtaining same, dinble salt of. C Schill and C Seilacher.
Armature conductor for dynamo electric machines. H Geisenhoner and C Sandman.
Automatic switch. J Moeller.
Axle. L I Waite.

Bales, end cap, tie, and seal for cylindrical cotton. L W Campbell.
Baling press. O Gates.
Band tie. S Knightom.
Barber's chair. E Melchior
Barrel or package, metallic. G Waterson.
Batteries, constructing secondary. A Hongh.
Battery. H N F Schaeffer.
Bean picker. A A Bacon.
Bed brace. G W Green.
Bed brace. H C Heitman.
Bed or couch, invalid. R V Wicks.
Bedstead. N Ernst.
Bee smoker. J E Crane.
Bell, bicycle. G W Goff.
Bicycle attachment. C A Coey.
Bicycle brake. W M McCarthy.
Bicycle luggage carrier. F A Martin.
Bicycle pump, automatic. W R Moore.
Bicycle stand. C Mee.
Book and index, combined order. S B Rosenbanm.
Boring machine. G T Whitney.
Boring mill turning and facing attachment. J T Williams.
Bottle closing device. L F Thomas.
Bottle. infant's feeding. G Muller.
Bottle, non fillable. J H Reeland.
Bottle stopper. F T Robinson.
Brake slack adjuster. F Robinson.
Brake slack adjnster. J H Sewall
Brick kiln. J K Caldwell.
Brick kiln fireplaces, portable grate for. W M Leonard.
Brick, lock. G J Herth.
Brush, shaving. W S Finley.
Buckle, suspender. G F Atwood.
Burglar alarm and house call, electric. H L Carpenter.
Burial casket handle. L E Woodard.
Burning fuel, process of and apparatus for. F H Richards.
Button and staple feeding mechanism. W G Metcalf.
Cabinet. E W Woodruff.
Can filling machine. H C Hemingway and C E Barber.
Can heading and crimping machine. J W Gheen.
Can heads, punch and die for forming key opener. N Troyer.
Cane mill. J H Fogarty.
Capsule cutting machine. T C Merz.
Capsule trimming machine. T C Merz.
Car buffing device. J Timms.
Car coupling. F R Bischoff and J C Baird.
Car coupling. J Depew.
Car coupling. W Dunlap.
Car coupling. B M Long.
Car door. B F Grant.
Car door, grain. E A Burrage.
Car dumping apparatus. A Walker.
Car fender. H B Ewbank, Jr.
Car fender. L L Seaman.
Car fender. S H Shaw.
Car fender. J C Sneden.
Car fender, street. S S Kimball.
Car fender, street. G H Modeman.
Car life guard. A E Wyatt.
Car motor, street. J C Slaughter.
Car rail brake. H E Boyd.
Car sanding device, street. F F Baumann and J Weinz.
Car seat bridge, portable. G M Fadner.
Cars, system and apparatus for applying brakes to electric. C E Davis.
Carbon holder for arc lights. A W France.
Carriage stump joint. T R Murdock.
Carriage top hood. L G Mayer and H K James.
Carriages, upholstery for baby. R F H Williams.
Cartridges, transparent top wad for. J N Lower.
Cash register. C W Swift.
Casks, etc., machine for smoothing and finishing exteriors of. C D Ames.
Casting apparatus, metal. E H Casgrain.
Casting sash weights, mold for. A B Day.
Casting steel. J A Potter.
Casting window weights. W Schwan.
Chains of transoms, etc., fastening device for stop. W F Hall.
Chair. H W Bolens
Chair. H W Bolens and J Gilson.
Chair. W Meyer.
Chenille, apparatus for manufactnring. F Watzlawik.
Chimney and ventilator cap. F C and H A Stober.
Chimneys, etc., attachment for. A H Blackburn.
Churn dasher. C H Hudson.
Cigar bunching machine. F J Hagen and L Wieland.
Cigar vending machine. A J Doughty.
Clay tempering machine, automatic. W F Cook.
Clipper. E S Hotchkiss.
Clock striking mechanism, electric. F L Gregory.
Cloth napping machine. N H Grosselin.
Clothes pin. M S Pittman.
Clutch. H W Hill.
Clutch. F L Smith.
Clutch. A L Taylor.
Coin delivering and cash recording device. A N Rooks.
Collar clasp. C L Jordan.
Collar, horse. C A R Ahl.
Combination wrench. C W Bennett and C W Poe.
Cooker, animal food. H F Winkelmann.
Cooker, steam feed. J W Adney.
Cooking utensil. J Velie.
Cooler for water, etc. G F Barron.
Corkscrew. A L Qvarnstrom.
Corset. I M Rew.
Cot, obstetric or invalid. D W Scutt.
Cotton cutter and cultivator. R B Morris.
Cotton picker. J Neighbors.
Cover fastener for cans, pails, etc. J Musgrove.
Cultivator. J O Ford.
Cultivator. A A Young.
Cutting machine. F J Richards.
Damper. D Slates.
Damper, stovepipe. H T Smith.
Dental heater and annealer. H F Libby.
Deodorizing fats or oils, apparatus for. J H Filbert.
Deodorizing sewage filters. G E Waring, Jr.
Derrick. H B Gates.
Desk, music. S W Rork.
Display figures, means for operating. J B Heibecker.
Dissolving apparatus. G M Newhall.
Door check. T McGrory.
Door check. P McMahon.
Door lock. C A Dies.
Dovetailing machine. J E Erickson and J Leonartson.
Drag and harrow, combined. A K Schaaf.
Drilling and tapping machine. E A Searles.
Dust collector, automatic. J F Cole.
Dust pan. R G Hebden.
Dyeing apparatus. A Whittall.
Eaves trough. H Andrews.
Egg beater. C H Warrington.
Electric cableway. R Lamb.
Electric generator, thermo 3. H B Cox.
Electric generators, indicating system for thermo. H B Cox.
Electric lighting system. J I Conklin.
Electric machines, construction and regulation of dynamo. C D Haskins.
Electric machines, regulation of dynamo. C D Haskins.
Electric switch. M W Dewey.
Electrical controller. E A Sperry.
Electrical fixture. L Stieringer. (Reissue.)
Elevator. N C Bassett.
Engine. F C Rinsche.
Engine indicator, steam. F M Clark.
Engine steering device, traction. M L Webster and P W Hutchens.
Engines, framing of steam. M R Moore.
Engines, link shifting mechanism for. E F Smith.
Evaporator, fruit. A H Blackburn.
Exhibitor, sample. B Palladino.
Eyeglass holder. W Mack.
Fan, centrifugal. G M Capell.
Faucet, duplex self closing. H S Teal.
Feed mixing and measuring device. D E Sampson.
Fence. S H Cook
Fence wire fastener. H B Swartz.
File, bill and letter. J M Keep.
File box. P J Pauly, Jr.
File for newspapers; etc. W I Reed.
Firearm sight. J A Kennedy.
Fire escape. J and J Anderson.
Fire extinguishing purposes, cellar pipe for. J M Baker.
Fireproof floor or ceiling. W H Brown.
Fishing reel. G E Medley.
Flue cleaner. J Bott.
Forge, portable. M Mehn.
Furnace S F H Richards.
Furnace and boiler, combined. J Cotter.
Furnace floor for traveling grate furnaces. F H Richards.
Furnace, traveling grate. E B Coxe.
Furnace, traveling grate 3. F H Richards.
Furniture, cabinet. G F Ruby.

Game apparatus. H Gardner.
Garment support. W E Jackson.
Gas wells, apparatus for discharging liquids from. J F Woods.
Gate. A Heim.
Gate spring. F W Lechner.
Girder clamp and hanger. C MacTaggart.
Governor. C J Weinman and E E Euchenhofer.
Grading machine, road. A Barhite.
Grass and similar fibres, process of and apparatu for treatment of rhea. H H Boyle.
Grate. A Schrag
Grinding balls, machine for. J J Grant.
Guns, ejecting mechanism for breakdown. M Bye.

Hammer, power E Hammesfahr.
Harrow with grain drill attachment, disk. W A Lee.
Harvester attachment. A McConnell.
Harvester, corn. C H Coel and J C Myers.
Harvester, corn. H Sommerfeld.
Harvesting potatoes, machine for. T F Maxwell.
Hat pressing apparatus. J Rowley.
Hat securing attachment. W G Wilson.
Hay carrier elevating pulley and yoke. J E Porter.
Hay press. P L Hider.
Hay rake and loader. C W Baird.
Head rest. G W Archer.
Heating apparatus, electric. M W Dewey.
Hides or skins, machine for treating. I Vaughn
Hydrant, fire. W W Corey, Jr.
Hydraulic machine. F Hessenbruch.
Hydraulic motor. A A Wood.

Ice discharging apparatus. G O Rinman.
Indexing. J C Brashear.
Injector 3. E Davies and J Metcalfe.
Ink well. S W Carter.
Insect powder duster. H C Adams.
Insulator. W J Belcher.
Iron, manufacture of Russia. A Hiles.

Jar fastener. F Monier.
Jewel protectors, roller. A N Gauthier.

Knitting machine. A Lee.
Knitting machine looping attachment, circular. F C Rehm.
Knitting machine tension take up device. A McMicheal and F B Wildman.
Knob, drawer. C Tollner.

Label holder. G H Richter.
Lace tag and tie fastener, boot or shoe. A E Davis.
Lace tagging machine, shoe. J L, J E, and S Faire.
Lacing hooks, etc., mechanism for feeding. I E Chandler.
Ladder attachment, safety. A K Berkman.
Ladder, extension. B A Hill.
Ladder, portable. T Sooy.
Lamp. F W Ives.
Lamp burner. H Saisbury.
Lamp, electric arc. J C Knight.
Damps, automatic regulating device for controlling supply of oil to. C M Drennan.
Lantern holder, tubular. H Leavitt.
Latch. N H Colwell.
Lathe taper turning tool. Z B Coes.
Lathe, turret. Z B Coes.
Lathing, metallic. G Hayes.
Lawn sprinkler. C Anderson.
Lawn sprinkler. A Burt.
Leather punching machine. L L Barber.
Linoleum, apparatus for manufacturing. D N Melvin.
Linoleum, manufacturing. D N Melvin.
Lock. R R Ball.
Locomotive. M B Bulla.
Locomotive engine. F H Richards.
Loom heald. F and J Chaize.
Lubricating box. J J Melvin.

Mail bag. J G Strader and F J Rudd.
Malting drum. R R P Schmiedecke and E O Gade.
Match splints, machine for making. I D Weaver.
Matches, wind guard for lighting. J C Grout.
Mattress bed spring. P Fraser.
Measure, dressmaker's M C Kelly.
Measuring apparatus for liquids, automatic self. A Bowser.
Message and card receiver. J T Stone.
Metal drawing machine. H Dollman.
Micrometer gage. J E Williamson.
Mill feeder, automatic. J P Wehrer.
Molding cutting machine. W Zoeller.
Molds, pouring gage for. D L Van Riet.
Mower. D A Gilliom.
Music rack, adjustable. T H Dunstane.
Music rack, folding. J Rockwell.
Mustache guard. J Frampton.

Nail driving apparatus. L Kornder.
Necktie holder. G F Minto.
Numbering and paging machine. W E Hoole.

Oar, jointed. F Harbers.
Oil and gas separator. J S Bougher.
Oil can. W Frosch.
Oil gage. E H Lunken.
Ore crusher or pulverizer. W G Dodd.

Packing ring, metallic. W Michalk.
Padlock, permutation. C D Logan.
Pants securing device E C Ranch.
Paper bag machine. W Liddell.
Paper doll. W T Jefferson.
Paper making, machine for straining pulp for. T Torrance and J H Howell.
Paper sheets, machine for feeding. J H Knowles.
Pen, fountain. P D Horton.
Pencil sharpener. W I Turner.
Petroleum and oil of naphtha, solidifying. L Dardel and H Becoulet.
Phonograph operating mechanism. L Glass.
Picture hanger. L A Piaget.
Pie lifter. J E Sharp.
Planter 2. J N Wilson.
Planter, corn. G C Janney.
Plow. R C Fay.
Plow. H F Jessup.
Plow share immersing clamp. S O'Bryan.
Pool table. G Mauro.
Prescription indicater. W H Blaney.
Printing form W B Hamilton.
Propelling attachment for garden or like implements H Wilson.
Pruning knife. H O Hem.
Pulley, split. I K Althouse.
Pulley, split I N Hamilton.
Punch, check. H S Newberry.
Pyrotechnic compound. J Graham.

Railway, closed conduit electric. E M Bentley.
Railway, conduit electric. D O'Flaherty
Railway frog and switch, automatic. D Grublkey.
Railway signaling apparatus. W H Walsh.
Railway switch. A C Hoffman and E S Cook.
Railway tool. B Medloy.
Railway track leveling apparatus. H H Sponenburg.
Railway track signal. B Coddington
Rammer, road and pavement. L W Brown.
Ratchet brace. J J Dillenbeck.
Refrigerating machine, automatic. E W Howell.
Registering chair. J W Reynolds, Jr.
Registering shaves, hair cuts, shampoos, etc., device for. A Goldammer.
Relasting machine R Nagler.
Rice cleaning machine. J H Roman.
Rock crusher, gyratory. S C McLanahan.
Rolling mills, rolls for chain. O Klatte.
Rolling spur plates, rolls for. J W Watson.
Roving or similar machine. R B Daly.
Rubber, machine for washing and sheeting crude. M C Clark.
Rule, slide. E Hill.
Sad iron. T C Edwards.
Saddle cover, harness. E R F Hart.
Safety pin. C H Graham.
Safety pin. C L Missel.
Saw, drag. A T Stimson.
Saw filing machine. J M Newton.
Saw for cutting steel, circular. J Oldham.
Saw guide, band. H S Long.
Saw sharpening machine. J R Hall.
Seal, car. J F Getty.
Seal lock. F E King.
Seed, method of and machine for cleaning and delinting cotton. G W Washburn.
Self closing box or bin. C C Mallett.
Sewage disposal. G E Waring, Jr.
Sewing machine. G F Waldron and G W Powers.
Sewing machine rand and welt guide. S S Eddy, J T Collins, and A T Pike.
Shaft step, wagon G O Bucknam.
Shelving, portable. H B Butts.
Ships' bunkers, manhole for. J Murphy.
Show case. J Lochner.
Sizing cotton and woolen yarns, composition for. W B Sprague.
Skid. T W Sessinghaus.
Smoke consuming furnace. J M Thomas.
Smoke jack. C P Howard.
Smoke preventer. C Smith.
Snap hook. C H Smith.
Soldering machine. C L Olmstead.
Speed changing spur gear train. J Thomson.
Spittoon. J H Reynolds.
Spooling machine shell holder. J W Foster.
Spooling or winding machine shell holder. J W Foster.
Sprocket wheel attaching device. F J Stimson.
Square and bevel, combination. J McLean.
Stair pad. M H Marcus and W O Collins.
Stamp cushion, hand. R H Smith.
Stamp, letter box time. H G Wood.
Stand pipe. G A Roberts.
Starching device. W A James.
Starting alternating motor. O Chytraus.
Stave bending machine. R Stecher.
Steam boiler. J Buckley.
Steam engine. T F Crary.
Steam generator, sectional. L M G Delamay-Belleville.
Steel, manufacturing. J Bedford.
Stocking supporting clasp. E D Bancroft.
Stove, oil. A R Welch.
Stove pipe joints, machine for forming. J E Smiley.
Stove pipe shelf. W H Murdock and F Weigel.
Stump extractor. L Swenson.
Sucker rod socket. B Masseth and D W Black.
Sugar dissolving apparatus. G M Newhall.
Surgical instrument. J P Hawkes.
Swing, vertical rotary. W W De Vore.
Switch and switch shifter. R E Brackelsberg and L Graff.
Switch operating device. J C Woolverton.
Tag. L Weiss.
Telephone. W W Dean.
Telephone exchange apparatus. C F G M B de la Tonanne.
Telephone switch apparatus, automatic central. F Nissl.
Telephone switch, automatic. N H Holland.
Thill coupling. J W Sprint.
Thill support. E F Woodruff and R R Bellew.
Tin plate, apparatus for manufacture of. H N Norton.
Tin plate, apparatus for manufacture. E Norton.
Tin plate drying and fluxing machine. E Norton.
Tin plate, machine for manufacturing. E and H N Norton.
Tinning machine. E Norton.
Tinsmith's beading machine. F A Hadley and H F L Danford.
Tire, pneumatic bibycle. R S Anderson.
Tire upsetting machine. C Boulay.
Tobacco elevator. J U Allphin.
Tongs, cuspidor F D Crocker and E Earll.
Tool holder. J Armstrong.
Tools, etc., safety feeding device for rotary. A E W Meissner.
Tooth crown, artificial. W M Seeger.
Torch. J Graham.
Toy house. V W Wilson.
Tramway rail. W H Wright.
Tree trimming instrument. C S Miller.

Trolley wire clamp. W W Annable.
Truck, motor. J A Brill.
Truss for bridges, roofs, etc. J E Greiner.
Tuning hammer. W A Bremer.
Twine machine nipper. F G Becker.
Twisting coiler and drawing frame. R B Daly.
Type writer cabinet. J Williams.
Type writing machine. R T Smith.
Type writing machine. C B Whitaker.

Valise lock. W H Southworth.
Valve. D W Field.
Valve. J R Meadowcroft.
Valve, air brake. A J Michel.
Valve, balanced slide. S A Alexander.
Valve gear. W J Lewis.
Valve, rotary. B W Smith.
Vehicle coupling. C G Turner.
Vehicle motor. C A Tower.
Vehicle steering and propelling mechanism. J E Mann.
Vehicle tension spring gear. W Kyle.
Vehicle wheel. F P Share.
Velocipede crank shaft. F S Luther.
Velocipede, marine. J Klein.
Vending machine. W S Burnett.
Vending machine, coin actuated. W S Burnett.
Veneer press. W Clayton.
Ventilator. M C Parkhurst.
Vise. J O Therien.
Vulcanizer. E H Casgrain.

Wagon, dumping. A P Reed.
Wagon jack. H B Swett.
Wegon shoveling board. H Clark.
Washing machine. C Bopp.
Washing machines, means for operating. J Schroeder.
Water elevator actuating apparatus. G P Glenn.
Water meter, disk. J Thomson.
Water meter, proportional 2 J Thomson.
Water meters, means for controlling action of oscillated disks in. J Thomson.
Water motor. C L Wilkins.
Water, purifying. O Lugo.
Water wheel, turbine. A M Swain.
Weighing machine, automatic 3. F H Richards.
Whistle, revolving steam. J F Batchelor.
Wind engine. H T Sherman.
Windmill. E E Milliken.
Winding or spooling machine, thread. J W Foster.
Wire joint. N W Lillie.
Wire stretcher. B R Stere.
Wood, means for graining. A M Lawrence.
Wooden stopples, process of and apparatus for treating. R F Radebaugh.

PATENTS GRANTED MAR. 19, '95

Accumulator plate. G R Blot.
Acid, process of and apparatus for making sulfuric. E J Barbier.
Air brake. A P Massay.
Air brake, car. J S Trott.
Air brake coupling. L Sennett.
Air ships, means for propelling, guiding and controlling. D C Funcheon.
Ammunition hoist. A Noble and R T Brankston.
Awning. T and W H Coldwell.
Awning operating device. G T Thomson.
Axle lubricator, vehicle. H B Eareckson.

Baling press. S M Neely.
Band tightener. D L Oroft.
Bath tub. A G Ward.
Beds, base for reversible folding. G Brand.
Beds, detachable foot rest and table for. C Donald.
Bedstead brace. W S Payne.
Belt tightener. A E Price.
Bicycle handle bar. G K Kelsea.
Bicycle saddle. W B Buckley.
Bicycle shoe. C L Cushman.
Bicycle support. J R Crumpleton.
Bicycle wheel, wood rimmed. A Levedahl and G S Webb.
Binders, endless conveying device for automatic self. C Whitney.
Binocular. H A Sawyer.
Bit stock, extensible. H G Worthington and W Wheeler.
Blackboard, composition. G S Mayhew.
Blind slat holding device. N P Taylor.
Boiler. G A Anderson.
Boiler dome, steam W H Page.
Boiler safety device, steam. W Christensen.
Bolster spring. N L Holmes.
Bone cutting machine. J Poulson.
Book holder and advertising device. C L Whipple.
Box machine. M Eschenbeck.
Box machine safety attachment. A A Rheutan.
Boxes, manufacture of sardine or like. E R Peltier.
Bridge, draw. N C Jessup.
Bridge gate, automatic. W F Clausen.
Brooch pin. G Key.
Buckle. S Z Quint.
Building block. S E Kierolf.
Burial case. T C Nativel.
Butter printing machine. H Atwood.
Button machines, etc., feeding device for. C Radcliffe.
Button shell feeding mechanism. C Wooster and J Stuart.

Cam. A S Russell.
Can opener. C E Andrews
Car brake, railway. J C Beyerle.
Car brake, railway. I M Skillman.
Car, convertible. B Lowenberg.
Car coupling. J P Armstrong.
Car coupling 2. T Gaskins.
Car coupling. W L Gelston.
Car coupling. J A Sissom.
Car coupling. C H Smith.
Car, open railway. D K McLeod.
Car, railway. J F Stevenson.
Cars, apparatus for automatically limiting speed of electric. L S Wright.
Cars, fluid pressure brake mechanism for railway 2. B F Teal.
Cars, steam pipe coupling for heating railway. F Kementzy, Jr.
Carpet stretcher and jack. H F Jackson.
Carriage, cradle and sled, combined baby. F H De Tray.
Cart, road. C S and M A Gurney.
Cartridge reloading tool. D A Ripley.
Cash register, indicator, recorder and check printer. T Carney.
Casing cleaning machine. B Kleker and J Coger.
Catamenial sack. P W Dautrich.
Chain, means for automatically making wire. C F Smith.
Chart, dress. W J Marshall.
Check bit, overdraw. J Carter.
Chest, provision. C L Smith.
Chute, roller. E W Fuller.
Cigarette machine. W Hughes.
Cleaver, butcher's. F J Lowndes.
Clippers. C Carleton.
Clock, electric program. F Frick.
Coal drilling machine. C S Sheppard.
Coaster. P Boyton.
Cock, angle. C J Cooper and H C Ferris.
Cock, angle. W J Waldron.
Cock, ball. W H Rawe.
Comb. E J Miller.
Compensator, wire. N Ratchford.
Composing machines, manufacture of controllers for. F A Johnson.
Cone adjustment. F H Richards.
Confectionery cooling apparatus. A Horn.
Cooker, steam feed. H A Knwitzky.
Cotton, apparatus for handling lint. D M Campbell.
Cotton press. C Howard.
Crumb remover. J B O Shevill.
Cultivator attachment. U A Cleveland.
Cultivator disk. J R Newton.
Current motor, alternating. M Hutin and M Leblanc.
Cuspidor. W J Shilling, Jr.
Cut off, automatic N Lombard.
Cutter gage, rotary. H J Snyder and F Pitske.

Dental appliance. C W Barney.
Dental regulating pliers. E H Angle.
Device for assisting infirm persons. A Eustis.
Door and means for closing same, sliding. D Doyen and J Didion.
Door lock, sliding. A Lubbe and W J Keating.
Drain trap. J A Thomas
Dredging or excavating apparatus. C W Hunt.
Drill for boring meat. F Brearley and J Overend.
Dyeing apparatus. A Hinze.
Dynamometer. B F Perkins.

Egg beater. J V Ebel
Electric appliances, protective device for. J J O'Connell.
Electric conductors, tip for flexible. C H McEvoy.
Electric lights, etc., cord adjuster for. M B Hood.
Electromagnetic signal. T Spencer.
Elevator apparatus. W J Greenhough.
Elevator controller and door lock. T F Scott.
Elevator gate. C F Sullivan,
Elevator operating mechanism. E M Fraser.
End gate, wagon. H Steeck.
Engine driving gear, road. H H Blake.
Engine indicators, reducing wheel for steam. J S Calkins.
Envelope, safely coin G J Edwards.
Exhibitor, coin controlled surface. V P De Knight. (Reissue.)
Fastening device, covered. C E Van Norman.
Feed water heater, internal. D A Quiggin.
Felly expander. A B Arnold.
Fence stay, wire. L Billhimer.
Fence, wire. E J Griffin.
Fence wire twisting machine. W S Barker.
Fences, metallic stay for wire. M H Baer.
File case and desk, combined. W H Roberts.
File, letter and bill. E Seybold.
Filter, water. R R and C B Darling.
Fire escape. N Letzler.
Fireproof ceiling and floor. G Sandblom.
Fireproof furring and partition or wall. E E J Eils.
Fireproof partition or wall. N Poulson.
Flood gate. E Moon.
Floor construction. P M Brunner.
Flushing tank. F C Keller.
Fodder machine. A F Davis.
Folder and puncher. F C Mehnert.
Folding knife. F C Melchior
Form, drapery. W H Knapp.
Fuel. G J Altham.
Fumigator. O P McDonald.
Furnace grate. J D Wright.
Furnaces, means for removing dust, ashes, or heat from. R C Reading.
Furnaces, valve gear for regenerative. J Kernan and R B Yuille.
Game counter. E Tobin.
Garment hook. J C Cramp.
Gas, apparatus for manufacture of. G W Harris.
Gas controller. J T Thorpe.
Gas engine. W L Crouch and E E Pierce.
Gas engine. E R Gill.
Gas engine. H Swain.
Gas, manufacture of. G H Harvey.
Gas, process of and apparatus for producing and liquefying acetylene. E N Dickerson and J J Suckert.
Gear, compensating 2. G A Anderson.
Generator with instantaneous vaporization. L Serpollet.
Governor, steam engine. J V Ebel.
Governor stop motion. R H Rice.
Grain unloading apparatus. A and R Cowan.
Grate, H J Schneider.
Grate, agitating fire. J H Goodfellow.
Grease trap. T Henderson.
Grinding machine. H A Hayward.
Grinding machine, apple or other fruit. H Schmack.
Grubber, sage brush. D Anderson, Jr.
Gun carriages, pneumatic recoil check for. H A Spillerr

Harness trimming. C A White.
Harvester, bean. C W Crossman and A F Fowler.
Hat, crush. O R Langhammer.
Hauling apparatus. J H Bellamy.
Heel nailing jack. H Houle.
Heel nailing machine. J F Hines.
Heel trimming machine. C Shand.
Hinge. J V Brown.
Hoist, worm. J C Kreps.
Hoisting and conveying apparatus. P M Barrett.
Holdback for vehicle shafts. J G Robinson.
Hooks for supporting goods in show windows, chain of. W T Burns.
Horse power. G W Richerd.
Hose coupling. G A Anderson.
Hose coupling. H Goodspeed.
Hydrant, fire. J C Kupferle.

Index. A E Detwiler.
Induction coil. A F W Meyer.
Ink well. J Black.
Insulated trolley section and crossover. M M Wood and C K King.
Iron into malleable iron or steel, converting cast. S Hufty and J K Caldwell.
Iron into steel, converting cast. S Hufty and J K Caldwell.

Journal and bearing, shaft. W Schofield.

Keyed wind instrument. W Anthony.
Kitchen cabinet. J B Cline.

Labeling bottles, apparatus for automatically G, J G and M O Rehfuss.
Laces with wire tips, machine for providing. S L Pratt.
Lacing hook setting machine. I E Chandler.
Ladle. F A Rundle.
Lamp, electric arc 3. G R MacIntire.
Lamp, incadescent electric. W S Lowe.
Leather buffing machine. C S Johnson.
Lens for optical purposes. C P Goerz and E von Hoegh.
Lever opening gate. W Smith.
Lifting jack. M P Holmes.
Loom harness operation mechanism. J T Bolton.
Loom shuttle box motion. W Wattie.
Lubricator. L F Longmore.
Lubricator. J Medway.
Lumber drier 2. V L Emerson.
Mail marking machine. M V B Ethride and H E Waite.
Manhole cover. S Stuart.
Match. H P Feister.
Meat or vegetable chopper. J C Bullock.
Milk purifying apparatus. W A Clark.
Minnow trap. D Tufts
Mold oiling device. C J Lewis.
Motion, device for equalizing reciprocating. C P H Gzoon.
Mowers, reel adjustment for lawn. R Brown.
Musical instruments, dynamometer for mechanical. M Lochmann.

Necktie frame. G W Ritz.
Nippers, police. L Brown.
Nut and screw tightening machine. F P Brunean.
Nut lock. J M Albert.
Nut lock. H B Eareckson.
Nut lock. H Hagon.
Nut lock. H E Lantz.
Nut lock. L I Shoemaker.

Obtunding nerves method of and apparatus for. W P Horton, Jr., and A B Jones.
Oil, purfying sod. F N Turney.

Pail, dinner. L A Mertz.
Pan lifter. A Volkenrath.
Paper box 2. F P Birley.
Paper box, folding. A S Stiefel.
Pessary. W F Ware.
Petorleum or oil engine 2. V List and J Kosakoff.
Phenetidin, substituting products of. J F von Mering.
Photographic curtain shutter. W Oehmke.
Pianos, stringing. C S Weber.
Picture mats with square or rectangular holes, apparatus for providing. M E Childs.
Pill or tablet. P J Noyes.
Pipe and lining same. W T Ruete.
Planter, corn. J Collits.
Plastic material, making applique work from A H Freiberg.
Plating aluminum. W H Legate.
Pneumatic signal. W P Elliott.
Pulverizing mill. C R Western
Pump, force and lift. E Brockway.
Pump, measuring. C E Geo and W E Wilkinson
Punching machine. B F Hall.
Puzzle. E E Deuler.

Rail fastener, guard. G L Cummins.
Railway, closed conduit electric. J F McLaughlin.
Railway conductors, collapsible conduit for electric. H C Grant.
Railway, conduit electric. F P Bergh and C W Tarbox.
Railway signal. J R Jones.
Railway switch. J R Matter.
Railway tie plate. J T Stewart.
Reaping or mowing machine. G Beckman.
Reclining chair. G F Sargent.
Reel for reeling metallic strips. T V Allis.
Rein holder, harness. E Yates.
Rock drill 2. W H Dixon.
Rotary engine. C H Beeler, Jr.
Rotary engine. W Smith.
Rudder, vessel. M V T Dubreuil.

Sack tie. J E Wenger.
Saddles, billet or strap clasp for. C A White.
Safe protector. G C Smith.
Sales recorder and cash till, manual. C T Hard.
Sash balance, roller. R B Hugunin.
Sawmill head block. H Gawley.
Sawing machine for forming notches in beams. R J Orr.
Scale, computing. J H Swihart.
Scissors, punch and wire cutter, combined. J W Krauk.
Scubber. B H Johnson.
Seal press. H H Weuthe.
Sewing machine antifriction needle guide. W H McLeod.
Shade holding device, spring acnated. E T Burrowes.
Shaper or metal planer. M Flather.
Sheet metal folding machine T Smith.
Shutter, field of view divider. E Stowell.
Sign changing device, electric. W Sears.
Sign for electric lights, street. R S Wright and H C Bradford.
Sink attachment. J N Barger.
Siphon, steam. J A Styninger and M Schmaltz.
Slate picker. J Fern.
Sleigh brake. A Mecham.
Sleigh knee. A Olson.
Soles or heels, device for applying colored liquids to sides of shoes. C J Dorticus.
Spinning machine. S Thompson.
Split wheel. L S Bache.
Spoke extracor. E S Anderson.
Spraying apparatus. P A Myers.
Sprocket wheel coupling J E Worrell.
Staircases for dwellings, arrangement of. W H Lamson.
Stamp canceler. F B Hall.
Stamp holder and stamper. J H Dynes.
Stave jointing machine. J Winterbotham.
Steam boiler and furnace 2. O D Orvis.
Steam distributing system. F Sargent.
Steam engine, double acting. W Schmidt.
Steam engine for saw mill carriages, direct acting. W E Hill.
Stirrup. H Taylor.
Stocking toe and producing same. W H Howard.
Stone, artificial. J H and R M Power.
Stove, gas. E D Abbott.
Strainer, conductor. E G Minnemeyer.
Straw stacker. G E Wilson.
Stringed instruments. W H Howe.
Switch operating device. O Beaudry.

Tag. C Winkler.
Tanning, process of and apparatus for. S and G Dario.
Tanning vats, rocking frame for. J House.
Telegraph instruments, spring winding means for printing. J Burry.
Telephones, automatic toll box for. H C Root.
Telescopist's dome. N M Lowe.
Tennis marker, lawn. T T Lyons.
Thrashing machine dust conveyer. W C Berkeypile.
Tile in place, device for holding drain. B C Blanchard.
Tire, pneumatic. G H E Cooke.
Tongue support, wagon. J F Dehm.
Tool, combination. W Thompson.
Toy. M B Fritsche.
Tree holder. C B Brown.
Tug, thill. W H Kable.
Typewriting machine 5. J M Fairfield.
Typewriting machines, rod connecting device for. J M Fairfield.

Universal coupling. G A Anderson.
Upholstery spring. A E Beall.

Valve, stop and waste. F C Amsbary.
Vaporizer and igniter for oil motors, combined. W Lorenz.
Vehicle alarm. J M Christopher.
Vehicle running gear G Harris.
Vehicle seat. J Reichert.
Vessels, construction of 2. M V T Dubreuil.

Wagon, coal. G B Marx.
Wall paper, manufacture of. P Groeber.
Wall paper trimming machine. J M Brady.
Washing machine. J H Caldwell.
Washing or bathing apparatus. A G P Ebert.
Water closet. A Viale.
Water cooler and filter. J J Davenport.
Water wheel. C E Holley.
Watering trough. J S Woodward.
Wave motor. C L Caldwell.
Whiffletree coupling. W A Schleicher.
Whist, apparatus for playing duplicate. C M Paine.
Wick trimming device, lamp. A G Spencer and H R Lermitte.
Wind wheel. D Holcomb.
Windmill. C A Norcross.
Window screen, self regulating. W Thompson.
Wool washing machine. H W Chureh.
Wrench. C E Billings.
Wrench. W H Carpenter.
Wrench. J C McQuilkin.
Wrench. A L Winge.

PATENTS GRANTED MAR 26, '95.

Amidotriazin. W Herzberg.
Anchor. W R Baker.
Anvil, vise and drilling machine, combined. S B Myers.
Armature for electric machines. E C Morgan.
Auger, earth. G Laube.
Axle, wagon. D Bullock.

Band cutter and feeder. R L Dennison.
Banjo. S H Mason.
Batter droper and cake beater. E L D Hoyle
Bedstead. E J Barcalo.
Bell ringing device for vehicles. S A White and A M Glover.
Belt tightener. O Bach.
Bicycle driving gear. T B Snyder.
Bicycle, railway. R Herz.
Bicycle saddle cover. W C McIntire.
Blackboard. T Hooley.
Blinds, means for actuating window. W H Elwell.
Boat stopping and steering device. H A Sheldon.
Boiler cleaning compound. J Rohrkraut.
Book mailing corner. F W Wright and O A Logan.
Books, carbon holder for blank. L A Lipman.
Boot or shoe. B A Pickering.
Boots or shoes, machine for uniting soles and uppers of. W Carey.
Bottle cap. W H Northall.
Bottle stand. F W L Knuschke.
Bottles, valve to prevent refilling of. A C Kuster and W Hupchen.
Box head doweling machine. G W Moyers.
Box machine. J F Adams.
Box machine 2. W S Davis.
Box nailing machine. W S Doig.
Brake mechanism, automatic T Silvene.
Brick facing. C F Kolb.
Bridge, draw. B L Worden.
Broom head 2. R Raby.
Brush. S Bingeman and O Martin.
Buckle. C A Conger.
Buckle. J Parker.
Buckle, back band. W F Anthony.
Bungs, attachment for faucet. J W Griffin.
Button, sleeve. H Wexel.
Buttons, machine for manufacturing. H C Hausen.

Cable grip. L Hachenberg.
Candlestick, miner's. A Eck.
Cane and umbrella, combined. C H Morgan.
Cane and umbrella, combined. G Williams.
Car brake, cable. J B Z Dumais.
Car brake, railway. F Guy.
Car coupling. W B Dinsmore, Jr.
Car coupling. C W Hinton.
Car coupling. J N Meehn.
Car fender. A Hare.
Car fender. W A Morris.
Car fender. M M Scott.
Car feuder, street. M Clooney.
Car, hand. M V Kingsberry.
Car impelling mechanism. V Belanger.
Car screen guard, street. E W Selkirk.
Car switch device. S M Bradley.
Cars, portable device for unloading. G H Hulett.
Card grinding. B A and W Dobson.
Carriage curtain securing device M O Turner.
Carriage, folding baby. T H Wilcox.
Cart. A L Smith.
Cart, road. D Barker and A C Laird.
Caster. A A Allen.
Centrifugal machine. S C Rockman.
Centrifugal machine driving mechanism. O Ohlssou.
Chain wrench. J H Vinton.
Check row wires, anchor stake and gage for. G I Fannin.
Chip holder and game counter. E D Rockwell.
Cigarettes, manufacture of. A L Munson.
Clasp for garments, corsets, etc. W H Payne. (Reissue.)
Cloth singeing machine. W E Whittle and J R Reynolds.
Clothes hanger. J H J Ronner.
Clutch mechanism. W G Curtis and J D Isaacs.
Cock boxes, guide for stop. F H Cullen.
Coffee polishing machine. M Mason.
Collar and neck tie fastener. V F von Ried.
Corset or dress stay steels, machine for cutting off. D E Creech.
Cotton gin blast flue. F C Gammons and C M Shaw.
Crank arm attachment. F H Richards.
Crayon molding machine. C A Rittman.
Creamer, centrifugal 2. O Ohlsson.
Creamer, centifugal. A H Ried.
Crupper. M Gondreau.
Culinary implement. J J Hayes.
Cultivator. J Woolsoncroft.
Cultivator, corn. F Robert.
Cultivator, hand garden. C J Abbott.
Curtain fastener. A H Squier.
Curtain rod. W H Edsall.
Cut out, fusible. J J Wood.
Cutter head, rotary. E U Kinsey.
Cycle. W C Johnston.

Dam, gravity. E R Beardsley.
Damper. C T Redfield.
Decorticating fibrous plants, stems or leaves, machine for. J C Walker and J E Stephenson.
Dental cast. D C McNaughton.
Dental filling tool. T G Crymes.
Detergent compounds, manufacturing. W B Peterson.
Dish cleaner. E H Alvord.
Dish washer. J K Hodges and T C Dickson.
Ditching and grading machine. E F Sojourner.
Ditching and tile laying machine 2. O B H Hamneborg.
Ditching machine. G A Shields.
Drier. J F Gubbins.
Drill tooth spring. O B Pickett.
Drip stand for drinking glasses. J Kickhefel.
Drying sand, etc., apparatus for. A Forrester.
Dye, black. M Kahn and F Runkel.
Dye, blue azo. R Kirchhoff.
Dyeing, etc., apparatus for. A C T Stilwell.
Dyeing machine. A C T Stilwell.
Dynamite shell. C J Crowley.

Edger. M Y Warren.
Elbow fittings, mold for lining. G W Harrington.
Electric brake E D Lewis.
Electric current regulator. C M Jordon.
Electric switch. C C Chesney.
Electric switch. C J Miller.
Electrical meter, combination. H C Parker.
Elevator. A Longauer.
Elevator operating mechanism. D D Walton.
Elevator wheel. A Sedgwick.
Engine indicator cylinder, steam. F R Baldwin.
Eyeglass case or holder. A C White.

Fare register. L Ehrlice, G Rein and E Catlin.
Faucet. W A Frey and G S White.
Feed water heater. H Kohl.
Feed water heater and condeusing apparatus. E Green.
Fence lock and stay, wire. C M Suter.
Fence stretcher, wire. J Stauffer.
Fence tension device, wire. W H Fox.
Fertilizer. J W Hickman.
File, newspaper. G H Wright.
Filter. W B Lindsay, W E Tonner and A Lowmiller.
Filtering apparatus, beer. W Albach.
Fire escape. E W Potts.
Fire extinguisher, automatic. C W Kersteter.
Flanging machine. J Miskolczy.
Flash light mechanism. E D Evans.
Flexible tube. H H Brooks.
Floor clamp. S Mero.
Flour bolt, vertical. A Gillespie.
Forge. A Rice.
Fulling mill. E Gessner.
Furnace. F H Richards.
Furnace. R Wirth, J Neumann, and J Hillenbrand.
Furnace, traveling floor. E B Coxe.

Game register for pool tables. C A Hathaway and J W Golden.
Garment hanger. E W Horner.
Gas engine, explosive. J W Lambert.
Gig mill. H N Grosslin.
Glass blower's snap. M S Thompson.
Governor, steam engine. J Begtrup.
Grain binder. O S Ellithorp and J F Steward.
Grain binder. M Kane.
Grain drill. P M Gundlach.
Grinding mill. J F Winchell.
Gum, manufacture of starch. V G Bloede.
Halter tie. J Cornell.
Hammer. G A Lambert.

Hand pad. D Shirley.
Harvester, reapers, or like machines, knife or cutter for. M E Hunter.
Hat and coat hook, combined. M Wood.
Hat brim curling apparatus. J Ives.
Hay tedder. E A and M H Davis.
Hay tedder. C H Teicher.
Heel for boots or shoes, cushioned. B R Tilgren.
Hide stretching device. J W Chapman.
Hinge, trunk. W A Truesdale.
Horse power. S Z Schwenk.
Horse weight. D B Maconachie.
Hose coupling. F F Howe.
Hose covering, flexible. A P Cochrane.
Hot water generator. J Engelhart.
Hydrometer. T Lohnstein.
Indicator lock 2. J M Edgar.
Indicator lock. J Z Roraback.
Inkstand, fountain. L N Thomas.
Ink well. J Morton.
Insulating high tension coils of transformers. A Schneller and W J Wisse.
Insulation, applying. F E Case.
Jewels, producing metal art objects set with. V G Bloede.
Kitchen cabinet. J Berntsen.
Kitchen cabinet. S W Tate.
Knitting machine, circular spring beard needle. F H Gates.
Label holder. A C Mills, Jr.
Laces, clip for securing boot, shoe, or other. W H Thrift.
Lacing. F S McKenney.
Lacing hook heads with plastic material, die for covering. M Bray.
Ladder, fire. O B Hall.
Ladder hook. L Ferguson.
Lamp, safety. W J Callaghan.
Lathe for turning irregular forms. L G Merritt.
Lathing, metallic. W C Schaper.
Lighting device. I M Rose.
Lock. H V P Cooke.
Locomotive engine. E B Coxe.
Loom picker stick. W L Keith.
Machine case. J Hotsapillar.
Magazine camera. M C G de Giraudy.
Magnetic separator. J D McKinnon.
Mail bag catcher. C B Winsor and G W Cummings.
Mail bag hanger. G M Patterson.
Mainsprings, device for equalizing power of. O Bartel.
Malt, manufactnre of crypto. C L Hart.
Map M Arriaga.
Match making machine. H C Spaulding.
Match safe. S E Ball.
Metal rools, grinder and dresser for. W E Harris.
Metal rolls in their housings, grinder and dresser for. W E Harris.
Metallic blocks, process of and apparatus for making holes through. O Friedrich and W Schulte.
Microscopes, mechanical stage for. J P Swift.
Milling machine. J L Bogert.
Mine trap door. G Bonenberger.
Mining machine, electric. E C Morgan.
Mold for lining unions. G W Harrington.
Mold for lining unions or couplings. G W Harrington.
Motion controlling mechanism. A Sedgwick.
Musk, artificial. A Baur.
Nail driving machine box. J J Hayes.
Numbering machine. E P Teal.
Nut lock. D C Wetsel.
Oil burner, atomized. W S Luther and C T Cowart.
Oil purifier. F E Bailey.
Ordnance, recoil operated automatic. A A McKnight.
Organ. O E and G C Wick.
Oven door. F H Van Houten.
Overshoes on shoes, device for retaining. L J Weatherwax.
Packing, metallic. R Holmes.
Padlock, permutation. W E Hullinger.
Paint can. M A Marlynski.
Paper box. T F W Schmidt.
Paper box machine. A B Cowles.
Paper bucket. T F W Schmidt.
Peat cleaning and decorticating machine. G A Cannot.
Penholder. O A Weissenborn.
Pencil and sharpener, combined. E E Monroe.
Pessary. H M Paine.
Phantoscope. C F Jenkins.
Photographic retoucher. A E Peck.
Photographic roll holder. E B Barker.
Photographic shutter. W I Adams.
Photographic shutter. A G Tisdell.
Pianos, arch plate frame for upright. J B Mitchel.
Pickling sheets, etc., apparatus for. A E Sawers.
Pipe cutter. J H Vinton.
Pipe fittings, mold for lining. G W Harrington.
Pipe, machine for making continuous. R F Dockery.
Pipe threader and reamer. G Ressler.
Planter. L C Evans.
Planter, corn. G L Whiting.
Plow. M Weber.
Plow, garden. M P Jacobs.
Plow subsoiler attachment. W M Carter.
Plow, wheeled. H Lindestrom.
Pressure, apparatus for automatically intensifying and equalizing. C P Higgins.
Printing machine, cylinder. C Potter.
Printing press. J Brooks.
Printing press numbering attachment. E A Henkle and E P Teal.
Pulley, window weight. H L Hart.
Pulp, machine for molding hollow ware from 2. M L Deering.
Pulverizing rock, etc., machine for. P McKellar.
Pump, self regulating. V Montalto.
Pump, vacuum. J L Bogert.
Puzzle. H E L Fisher.
Puzzle. J D Miller.
Rail bender 2. A L Stanford.
Rail brake. F L Desmoineaux.
Railway and water tobogganing apparatus, inclined. E J Morris.
Railway, closed conduit electric. W Lawrence. (Reissue.)
Railway, conduit electric. F S Davenport.
Railway crossing signal. E A Hermann.
Railway gate. S S Smallwood.
Railway pulley, cable. E M Johnson.
Railway rail, reversible. B A Thomas.
Railway signaling. A Gregory.
Railway supply system, electric. C E Emery.
Railway switch. J H Reinhardt.
Railway switch, automatic. J M Deal.
Railway switch, electric. R A Baldwin.
Railway switch operating device. J F Ober.
Railway switches, means for operating. S H Miller.
Railway track. W R Smith.
Railway train. H L Simmons
Railways, construction of. E Gay.
Railways, system of electrical signaling for. C Selden.
Raisin seeder. W Johnson.
Register for measuring lengths of varying reciprocating strokes. G P Aborn.
Register and indicating machine. F L Bailey.
Relay. C R J Willot.
Respirator. H Schneckloth.
Revolving and reclining chair. W J Kluegler.
Road working machine. B Poulson.
Root cutter. J P Nickodemus.
Rotary steam engine. R L Henderson.
Rug, etc., steamer. E N Huyck.
Saddle. J C Speirs.
Sales recorder with coin displayer and cash drawer, manual. R Zabel.
Salt evaporator. N S Redfield.
Sash balance. J H Bane.
Sash, swinging window. D H Gail.
Saw set. J E Whiting.
Scaffold, window. H W Bullock.
Seal lock C V Boughton.
Seal lock. B S Shaw.
Seams of sheet metal cans, machine for forming and soldering lock. G T Pillings
Seat. J Mallett.
Shade guide. J J Hahn.
Shade holder. W C Homan.
Shade, window. A H Brumfield.
Shaft attaching device. J R Baxter.
Sheet metal hand rails, finishing. W Klose.
Shelf, book. R Linkletter.
Shelf, roller book. P J Pauly, Sr.
Shipping case. W T Boatwright.
Ship's log and course indicator, recording. J P Rogers.
Shoe. E S Harris.
Shovel foot guard. G Page.
Sifting apparatus. H Seck.
Signal and switch operating apparatus, electrical. J Dutrey.
Signal system, electric. W Gillette and A S Williams.
Signaling apparatus, electrical. W E M Jackson.
Skirt elevator. J Mallett.
Sled. D C Hamlin.
Snow plow for street railways. F W Dean and W E Mathews.
Soap holder. G W Gilham and J R Ervey.
Sole laying machine. E C Judd and A C Paul.
Sole pressing machine. W E Forster. (Reissue.)
Spectacles. T A Willson.
Spinning and twisting machine spindle. J W and H Collins.
Spinning ring. J Fowler.
Staunp affixing machine. E C Palmer.
Steam boiler. T Herald.
Steam engine. W R Dow.
Steam engine. W E Good.
Steam engine 2. J V Rice, Jr.
Stitch separating and indenting machine. J B Hadaway.
Stocking. G H Vernon
Storage structure, knockdown. J Macdonald.
Stoves, filter for gasoline. C S White.
Stub holder. W Willis.
Stump extractor. J T Emerson.
Submerged way. M A de Palacio.
Suppository machine. C A Tatum.
Switches, automatic safety lock for. J W Tew and J D Riggs.
Sword scabbard. H O Weller.
Tablet, order.
Telegraphy. P B Delaney.
Telemeter 2. F L O Wadsworth.
Telemeter attachment, telescope. F L O Wadsworth.
Telephone. J D Price.
Telephone exchange system. S W Holman.
Telephone system. J I Sabin and W Hampton.
Tire, pneumatic. W A Warren.
Tire tightener. M L Howard and G J Grandpre.
Tire, wheel. M Adler.
Tower, metal. H P Hanson and W C Meyerick.
Toy. W R Austin and W N Craw.
Toy, game. O T Dougherty.
Toy, mechanical. H Crossley and T Birnbaum.
Trolley systems, adjustable switch for. M M Wood.
Trolling spoon. D J Cook.
Truck. J P Harper.
Truck. H L Hazen.
Truck, car. W W McKee.
Tuning device for stringed musical instruments. F B Converse.
Tuyere iron. A Pederson.
Twine and manufacturing same. G H Ellis.
Type case bracket or support. S Stephens.
Type writer drop cabinet. L S Hayes.
Type writing machine. H Jarvis.
Type writing machine. T H Stackhouse.
Umbrella holder. C T Work.
Valve, automatic. R H McMath.
Valve, balanced slide. H C Clay.
Valve device. T L Webster.
Vehicle brake, pneumatic. H P Booth.
Vehicle front. J Sauder.
Vehicle toe rail. C C Bradley.
Vehicle wheel. G Jobson.
Velocipede. N Smith.
Velocipede provided with electrical communicating apparatus. R H Wolff.
Venning machine, coin operated chance. E Lawrence.
Vise. W J Wanless.
Voting machine. F H Gilbert.
Watch movement box. C Morlet and P Nordmann.
Watchcase pendant. P C Elser and C H Cannill.
Water closet cistern. B Dale.
Water closet flushing tanks, chain pull for. J W Temple.
Water closet ventilator. W Scharnweber.
Water cooler. F M Underhill.
Water heater. W Scharnweber.
Water tube boiler. H L Wilson.
Wax holder, sealing. E R Moore.
Weather strip. P Wickes.
Weigher, grain L C Guttery.
Weighing machine, automatic. C R Gorringe.
Wheel supporting and truing device. A Dudly.
Whiffletree hook. L S Flatau.
Whiffletree hook. T G Mandt.
Whist tray, duplicate. H H Everard.
Wire stretcher. A H Sensenig.
Wrench. E N Woodward.
Wrenches, making. J C Speirs.
Yoke key, ox. B W Johnson.

PATENTS

Joseph Leicester Atkins,

Patents and Patent Causes.

Atlantic Building, WASHINGTON, D. C.

Sixty page book free.

NEW BOOK--JUST OUT.

How to Make and Use the Telephone.

By GEORGE H. CARY, A. M.

Illustrated with working drawings; and gives practical directions for building and operating telephone lines. Just the book for anybody interested in this subject. It is the latest book published, and is up to date.

Contents: CHAP. I. The Telephone. II. The Telephone Line. III. How to make Receivers of Simple Construction. IV. Batteries best suited to Telephone Work. V. Magneto Call Bells. VI. Switch-boards. VII. Telephone Troubles and How to Remedy Them.

PRICE, Postpaid, $1.

Address, THE INVENTIVE AGE,
WASHINGTON, D. C.

WM. DUFFY,

REGISTERED

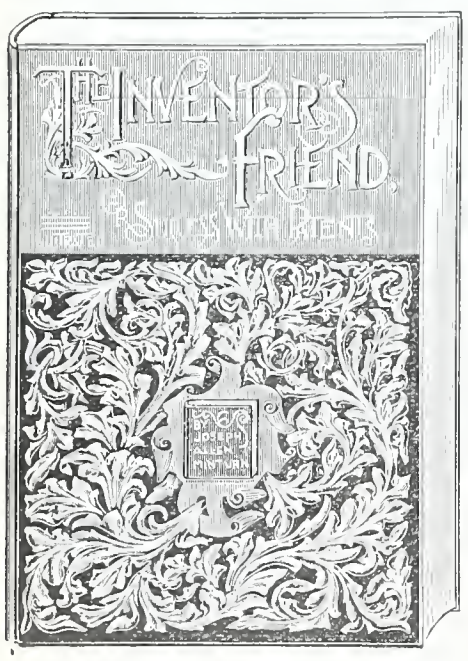
Plumber and Gas Fitter,

1130 N. CAPITOL ST.,

WASHINGTON, D. C.

ESTIMATES FURNISHED

Orders by mail will receive prompt attention.



One of the most interesting and useful books for inventors published. Elegantly bound. Price 50 cents.

☞The above book and the INVENTIVE AGE one year, $1.35, Address

THE INVENTIVE AGE,
Washington, D. C.

JUST PUBLISHED.

Dynamo Builders' Hand-Books.

By A. E. WATSON.

No. 1. How to Build a ¼ Horse Power Dynamo or Motor.
No. 2. How to Build a ½ Horse Power Dynamo or Mortor.
No. 3. How to Build a 1 Horse Power Dynamo or Motor.
No. 4. How to Build a 1,000 Watt Alternating Current Dynamo or Motor.

Each Book Contains FULL WORKING DRAWINGS and INSTRUCTIONS for BUILDING the DYNAMO or MOTOR.

Price 50 cts,. Postage Free.

BUBIER BUBLISHING CO.

P. O. Box 309. LYNN, MASS.

S. H. Hines, ...

MAIN OFFICE:
423 G Street, N. W.

BRANCH OFFICE:
910 4½ Street, N. W.,

Telephone 775. WASHINGTON, D. C.

Undertaker and Embalmer.

Twenty years experience in the business. First class work guaranteed at reasonable prices.

Arrangements can be made with us by telegram for funerals in any city or town in the United States or for transfering bodies from one city to another. Open day and night through the year.

S. H. HINES, President of the Peoples Co-Operative Burial Association, D. C.

GEO. S. DOREMUS. FRANK C. JUST.

Doremus & Just.

414 Eleventh St., Star Building,

WASHINGTON, D. C.

All kinds of screw machine work. Bicycles built to order, repaired, nickle plated and enameled with baked enamel. Gold, silver, nickel, copper and bronze plater.

Model Makers,
Manufacturers of
Patented Novelties and Electric Supplies.

CHANDELIERS REFINISHED IN THE LATEST STYLES.

OUT OF TOWN WORK SOLICITED.

Just Published.

Standard Electrical Dictionary,

By Prof. T. O'CONOR SLOANE,

Author of "Arithmetic of Electricity," Electricity Simplified," Electric Toy Making," Etc.

624 Pages. 350 Illustrations. Handsomely Bound in Cloth, 8vo, Extra Super Calendered Paper, **$3.00.**

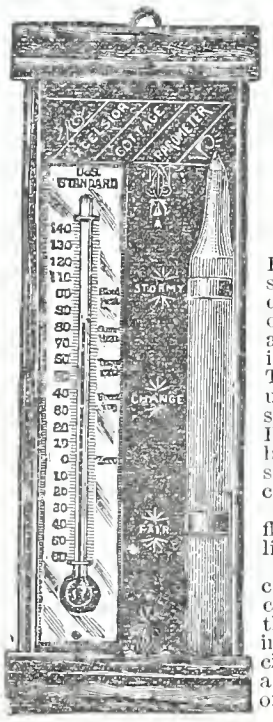
The large sales of the author's previous works, and the flattering reviews they have received from all sources, together with the great demand for a Dictionary of this kind, have led Prof. Sloane to complete, after a vast amount of labor, a work of a very high standard.

In publishing the "Standard Electrical Dictionary," we have adhered to what the work purports to be, exhausting the subject of electrical terms, giving each title the clearness of explanation necessary to make the understanding of it complete, without unnecessary elaboration. In this work, every electrical word, term, or phrase will be found intelligently defined.

The work is absolutely indispensable to all in any way interested in "Electric Science," from the higher electrical expert to the everyday electrical workman. In fact, it should be in the possession of all who desire to keep abreast with the progress of the greatest science of the times.

PREPAID TO ANY ADDRESS ON RECEIPT OF $3.00.

Address,
THE INVENTIVE AGE,
Washington, D. C.



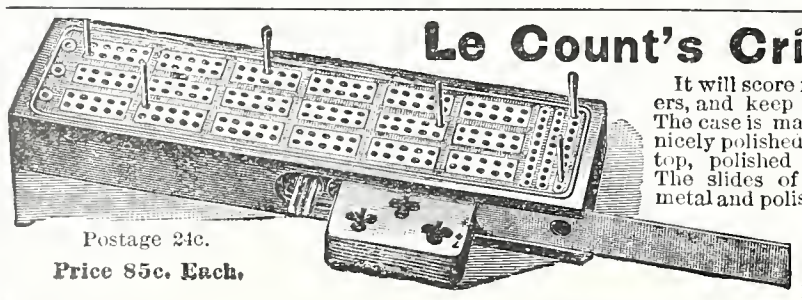
THERMOMETER & BAROMETER COMBINATION.

Combination Barometer and Thermometer.– Our well known leader. Blue and Gilt back with metal side posts. Fancy top and bottom and handsome enough to decorate the home of a millionaire. Extra well made and dependable on for showing changes in both weather and temperature. One of the biggest bargains in our list. A handsome thermometer, together with a glass tube containing a chemical preparation which rises and falls by action of the atmosphere, foretelling correctly all changes in the weather. This is a new style storm glass and the most reliable ever known, being in use in all signal service stations. The slightest change in the atmosphere in some way affects this glass. The thermometer is also of the best quality. Both are enclosed in a stand with walnut top and bottom and blue and gilt back. On either side is also a strong metal bar giving the whole great strength and adding to its appearance. Altogether it is a most remarkable combination for the price and we take pleasure in offering it to our patrons

This is not one of the many cheap combinations of which the market is flooded which are neither good for ornament or use and can never be relied upon to forecast either the weather or in fact any thing else.

There is no reason for you to depend on the weather Bureau reports as every person who owns one of our Combinations, can make his or her forecast and tell exactly when it will be fine, rainy and in fact every change in the weather. With this you can tell whether to put on rubbers and a mackintosh or a pair of summer shoes and a costly dress. Don't take any more chances about the weather but be prepared. Each one packed securely in a neat box so that they can be mailed up without any fear of getting broken or damaged. Postage 10c. **Price 32c. Each; $3.00 Doz.**

With "Inventive Age" one year $1.25.



Le Count's Cribbage.

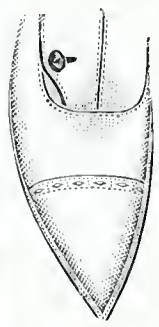
It will score for three or six players, and keep tally of the games. The case is made of black walnut, nicely polished; has a solid metal top, polished and nickel plated. The slides of compartments are metal and polished. This Board is superior to Boards that sell for three times the price. Full directions with each Board.

Postage 24c.

Price 85c. Each.

With "Inventive Age" one year, $1.60.

Shoes by Express $3.50.



Send your name, address, size of shoe, width, and a pencil outline of your stocking foot, also, style of toe preferred broad, medium or pointed, and $3.50, and we will send you (express prepaid) a pair of our fashionable russet or black true-comfort shoes. Please mention "Inventive Age" in answering this advertisement.

$3.50 & 5.00 SHOES
Wilson's

929 F Street, Northwest,
WASHINGTON, D. C.

BUCHANAN BROS. & FULKERSON,

Manufacturing Opticians.

Oculists' prescriptions a specialty.

1115 F Street, N. W., WASHINGTON, D. C.

THE WASHINGTON LOAN AND TRUST CO.

FIRE-PROOF GRANITE BUILDING.

PAID-UP CAPITAL $1,000,000.

Organized under act of Congress and under the supervision of the U. S. Government.
Furnishes first-class investments.
Executes trusts. Loans money.
Pays interest on deposits.
Rents office rooms and safe deposit boxes.

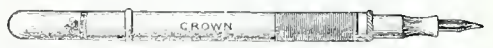
OFFICERS.

JNO. JOY EDSON, President.
JNO. A. SWOPE, Vice-President.
JNO. R. CARMODY, Treasurer.
ANDREW PARKER, Secretary.

EXPERT MODEL MAKING

Established 1867.

J. C. SEYL, Prop'r, Chicago Model Works,
179-181 E. Madison St., Chicago, Ill.
Write for catalogue.



CROWN FOUNTAIN AND GOLD PENS.

MEDALS AND DIPLOMAS

at COLUMBIAN EXPOSITION, Chicago.
MIDWINTER FAIR, San Francisco.

CROWN PEN CO., Manufacturers,
78 STATE STREET, CHICAGO,

THE COLUMBIA NATIONAL BANK,

911 F Street, N. W.,

WASHINGTON, D. C.

A General Banking Business Transacted.

Accounts of Individuals and Corporations Solicited.

CAPITAL $250,000.
SURPLUS $100,000.

E. S. PARKER, ... *President.*
A. F. FOX, ... *Vice-President.*
CLARENCE CORSON, ... *Cashier.*

THE

Railroad Car Journal

IS THE ONLY

publication in the world devoted exclusively to the construction, maintenance and interchange of Railroad Car Equipment. A Journal for Superintendent of Car Department, Foreman, Inspector and Repairer; and especially for inventors of car appliances. Subscription ONE DOLLAR per year. Sample Copy Gratis.

617 Vanderbilt Building, NEW YORK.

The Inventive Age
AND INDUSTRIAL REVIEW.
A JOURNAL OF MANUFACTURING INDUSTRY AND SCIENTIFIC PROGRESS.

Sixth Year. No. 5. | WASHINGTON, D. C., MAY, 1895. | Single Copies 10 Cents. $1 Per Year.

The Cotton States Exposition.

That modern and energetic city of the South, Atlanta, is just now making preparations for an event that promises to eclipse in interest and magnificence any previous affair of the kind held in the South, not even excepting the New Orleans Exposition. While the exposition is generally spoken of as the Cotton States Exposition, it comprises vastly more in its aims and ambitions. It is really an international affair as well as inter-state, and the preparations being made for the event are being prosecuted on such a large scale as to challenge the admiration of the whole country. The exposition opens on September 18th and closes December 31st. Congress endorsed the enterprise by making an appropriation of $200,000 and many of the northern, as well as the southern, states have made provision for suitable exhibits. It promises to be a miniature World's Fair that even the enthusiastic Chicagoan will admire. Manufacturers throughout the country are taking an interest in the enterprise and in the electrical and machinery line the exhibit promises to be very complete. The exposition site is Piedmont Park, located two miles from the center of the city of Atlanta. More than $300,000 has already been expended in heightening picturesque features of the landscape, and about $2,000,000 will be expended in all to make the fair. Great inland lakes have been constructed, and, with few exceptions, the buildings will have water frontage.

In this issue we present illustrations of two buildings—the Administration Building and Electrical Building—and a birdseye view of the spacious grounds, made famous by the fact that over the rifle pits thereon, thirty-one years ago, Sherman threw the first shell into Atlanta.

ADMINISTRATION BUILDING, ATLANTA EXPOSITION.

Besides the United States Government Building, there are twelve principal structures, most of which are under construction, under bond for completion by June 1st. The others are to be finished by July. The following is the list: Manufactures and Liberal Arts, Fine Arts, Agriculture, Auditorium, Administration, Fire, Machinery, Minerals and Forestry, Negro, Transportation, Electricity and Woman's. The leading idea is Romanesque, and the buildings are designed with an idea of stability and simplicity in construction, and architectural effects will be produced by outline and proportion rather than by detail and tawdry ornamentation. Mr. Bradford L. Gilbert, of New York, the supervising architect, is the designer of ten buildings; Mr. Walter T. Downing, of Atlanta, furnished the design for the Fine Arts Building; and Miss Elise Mercur, of Pittsburg, the design for the Woman's Building. These buildings are of good size, Machinery Hall being 500 feet long and 118 feet wide, and Administration and Electrical buildings but a trifle smaller.

The design for the Administration Building is a composite of the old baronial castles, those strongholds of our ancestors in the feudal age. The principal entrance is reached under the portcullis, and guarded, as in the days of the war-like barons, by the iron teeth of the hugh iron-spiked gateway. The main tower will recall the Rheinstein, that old Prussian stronghold on the borders of the Rhine. The entrance archway, frowning down with its deeply embedded windows and loop-holes, is entered by a circular doorway, hewn from rough stones thrown together, is a model of the old door of the bloody tower, a part of the famous Tower of London.

Mr. H. M. Atkinson, chairman of the Department of Electricity, has succeeded in working up considerable enthusiasm among the electricians of the country, and new and novel features are promised, eclipsing in many respects the wonderful effects at the Chicago exposition. It is the aim of the Department to make the Electricity Building an exhibition of select exhibits, showing the most recent developments in the line of manufacturing and excluding those which are out of date.

The exposition will not lack for amusements, a sort of "Midway Plaisance" being arranged for with Buffalo Bill's Wild West Show at the end of the street.

Atlanta is a city of 110,000 people, possessing magnificent hotels and ample accommodations for strangers. The city itself stands as a monument to the New South, which region, owing to the wonderfully varied and exhaustless resources—in all those products of the mine, forest and field that combine to attract capital and enterprise—is now receiving so much attention and is promised such substantial progress.

Chas. A. Collier is President and Director-General of the Cotton States Exposition and W. G. Cooper, a live, wide-awake and courteous gentleman, is chief of Department of Publicity and Promotion.

The Inventive Age

Established 1889.

INVENTIVE AGE PUBLISHING CO.,

8th and H Sts., Washington, D. C.

ALEX. S. CAPEHART. MARSHALL H. JEWELL.

The INVENTIVE AGE is sent, postage prepaid, to any address in the United States, Canada or Mexico for $1 a year; to any other country, postage prepaid, $1.50.

Correspondence with inventors, mechanics, manufacturers, scientists and others is invited. The columns of this journal are open for the discussion of such subjects as are of general interest to its readers.

Technical matter is particularly desired. We want practical information from practical men.

Nothing will be published in the editorial columns for pay.

The INVENTIVE AGE is thoroughly independent.

Advertising rates made known on application. Special facilities for furnishing cuts of any patented article together with descriptive article. Business specials 25 cents a line each insertion, 7 words to the line. No advertisement less than 50 cents.

Address all communications to THE INVENTIVE AGE, Washington, D. C.

Entered at the Postoffice in Washington as second-class matter.

WASHINGTON, D. C., MAY, 1895.

THE Baird Electric Conduit Company has been organized in Chicago with a capital of $5,000,000.

THE test of one of the 5,000 h. p. turbine wheels and the 5,000 h. p. electrical generators at Niagara, on the 6th of last month is said to have been highly satisfactory.

IT is probable that the Columbian Iron Works of Baltimore, under their lowest bid of $292,500, will be awarded the contract for building the three seagoing torpedo boats.

AS a result of the organization of a powerful company against the Bell Telephone people that corporation will, it is said, reduce its rates in Philadelphia from $120 to $50 a year. The number of calls will, however, be restricted.

A BILL is pending in the New York Legislature to charter a company with a capital of $150,000,000 to construct a ship canal capable of taking vessels five hundred feet long, sixty feet wide, and twenty-six feet deep, from Lake Erie to the Hudson River.

MR. Charles F. Foster, late mechanical engineer of the Columbian Exposition and recently appointed chief of the engineering and electrical department of the Cotton States International Exposition, Atlanta, Ga., entered upon the duties of the position April 1.

THE city of Pittsburg is again the centre of active industrial pursuits. The increase in the pay rolls is more and more marked each week. It is estimated that at least 125,000 persons are now employed in the leading industries of the city and the only mills that are idle are those in litigation or undergoing repairs.

IT is at least amusing, if not gratifying, to the grand army of exhibitors at the World's Fair to see the semi-official announcement every week or two that "work upon the medals is progressing most satisfactorilly." The latest announcement in this line is that the 24,000 medals will be ready for distribution about August 1st.

CARE should be exercised in the punctuation of applications for patents as hereafter the punctuation made by applicants will be strictly followed in the printing of the claims in the Official Gazette and specifications. Frequently the misplacing of a comma or the omissionof a comma or period will change the whole sense and intent of a claim.

AT a recent hearing before the Railroad Committee of the Connecticut Legislature counsel for the New York, New Haven & Hartford Railroad Company submitted a statement showing the losses in local passenger traffic, due to the competition of parallel electric lines. The falling off in traffic is even greater than has been generally realized, and in view of the fact the opposition to the further construction of competing electric roads is not surprising.

IN commenting on the general improvement in business and the pecularity of the markets, the rise in oil and conscquent greater demand for coal for fuel, the Iron Trade Review observes that "it is surprising the number of developments that have been witnessed since the coming of '95, each assisting in an unlooked for way to get an important industry upon a better basis."

IN a review of the situation by the "Railway Age," some interesting and encouraging figures are given, relating to railway construction at present on the way, or in immediate contemplation. The totals cover forty-six states and territories, 373 lines, and 20,547 miles. Texas leads with 2,913 miles projected, followed by Arkansas and California with about 1,400 miles each.

A SPECIAL train on the Pennsylvania road on the 22d ult., made the time from Philadelphia to Atlantic City, a distance of 58 3-10 miles in 45 minutes the average speed being 76½ miles an hour. The fastest single mile was made in 41 seconds which is an averege of 87 4-5 miles an hour. This is the fastest time ever made for so great a distance on a railroad line in this country.

THE progress of America, and its advancement in the utilization of electricity for motive power for street railways in particular, is illustrated in the recent publication of comparative statistics. The total mileage of European electric lines in nine different countries is but 191. Compare this with one single city in America—Brooklyn with 331 miles. The power required to operate a single plant in Brooklyn or the West End Street Railway Company of Boston is nearly 25 per cent greater than that required to operate all the electric lines of Europe combined.

THE new 13-inch guns, manufactured at the Washington gun foundry, are the largest ever made in this country and said to be the finest specimens of ordnance in the world. There are twelve of these monster guns, four each for the battle ships Indiana, Massachusetts and Oregon. The last named vessel is being built at San Francisco and the other two at Philadelphia. These guns weigh sixty tons each and require specially constructed cars for their transportation. To transport these monsters across the continent to San Francisco is something of an undertaking but as no accident attended the shipment of the 12-inch guns last year little fear of accident is now anticipated by either the government or railroad officials.

THE recent letter of President Cleveland on the money question. last month, has overshadowed the decision in the income tax matter. In the west, where the sentiment in favor of free silver had taken strong hold, and politicians, particularly in the Democratic ranks, have been flirting with the Populists, the letter from the President created intense excitement. The activity of the administration in this matter is equalled only by the President's earnestness, and as a result a determined and united effort is now being put forth by the Democratic leaders to stay the free silver tide which promises to divide the party into irreconcilable factions. In the meantime the Republicans are refraining from boistrousness, and while generally opposed to the free and unlimited coinage of silver there are, nevertheless, evidence in the west and south of great uneasiness threatening open disruption before the next state and national conventions.

A RECENT issue of The Tradesman of Chattanooga Tenn., is devoted largely to cotton mill statistics comprising probably the largest contribution to the subject since the interest of the east became well enlisted in the trade of the south, nearly a year ago. The figures of the southern industry are of a character that might be called startling, but for the fact that nobody is startled, nowadays, by any achievement in the line of industry. A growth of almost 100 per cent in spindles and looms, in five years, will probably satisfy those who have been most skeptical about it, that the south is really establishing a great cotton industry, right by or among the cotton fields. Spindles increased in the five years from 1,699,000 in 1890, to 3,001,000 in 1895, with certainly an equal increase in sight, in the five years that are to round off the century. And while the south added more than 90 per cent to her spindles and looms, in five years, the eastern trade added less than 5 per cent of either one.

THE three important events of last month were the open hostilities of the Cubans against the Spanish soldiers, looking to the independence of the island, the termination of the China-Japan conflict and the agreement on the terms of peace. and the occupation of Corinto, a Nicaraguan port. by the British, for the purpose of enforcing the payment of $75,000 indemnity for indignities alleged to have been shown English subjects by the Nicaraguan authorities. Russia is dissatisfied with the terms of peace in the China-Japan controversy and unless Japan modifies them threatens open hostility. In the Cuban matter Spain is sending over more troops and the rebellion is a failure, and in the Nicaraguan incident it is likely an extension of fifteen days will be given the Nicaragnan government in which to pay the indemnity—the latter concession obtained through the intercession of the United States.

THE announcement of the plans of the new Standard Telephne Company last month was as premature as the news was welcome. The originators of the scheme, it seems, had not intended that the public should be taken into their secrets until some time in the summer when it was anticipated that active operations would have been inagurated throughout the country. The scheme was of such magnitude, however, that the secrecy maintained for many months was finally broken by some enthusiastic insider. This company claims to be the possessor of three out of the five important patents covering telephones, which if true places the company at once on an equal footing with the Bell people with the rather important exception of obtaining franchises. While the anticipations of the stockholders and promoters of the new company may not be entirely realized the public will at least be gratified in the prospect of cheaper and better telephone service, amounting generally and ultimately to not less than from 40 to 60 per cent. The whole country has been parceled out to state and district companies formed to operate as licensees of the present company, the whole aggregating a hundred million or more in capitalization. Some of the most successful and distinguished business men of the country are connected with the enterprise. Thurlow Weed Barnes is president and the directory is composed of exceptionally strong men.

A New York court has decided that when a passenger drops a nickel on the floor of a street car it pays his fare the same as if handed to the conductor, and that in case of a larger coin the conductor must give him the proper change. The theory of the decision is that the company owns the car, and a coin dropped accidently is therefore in its custody.

Miss Virginia A. Copeland of Washington, inventor of an ingenious gas shade and heater, particularly desirable for the sick chamber, has made arrangements with the Geo. F. Sargent Company of New York to manufacture the device on royalty.

In some Japanese temples may be seen suspended great coils of rope woven from human hair. Such rope, made of hair sacrificed by thousands of women and girls, were used to hoist stone and timber, for the temple, and are preserved as relics.

A glow worm has a brush attached to its tail because it is necessary to show its light that the back be kept clean.

NOTES.

Horseflesh Sausages.—The consumption of horseflesh in France is increasing rapidly and its introduction into Germany is also received with welcome. While much of it is sold in cities, the larger portion is used in making sausages. Over 30,000 horses are annually killed in Paris abattoirs alone.

* * *

Largest Diamond in the World.—A diamond weighing not less than 971¾ carats, and said to be the largest in the world, has been found in the Jagersfontein mines, Cape Colony, by Inspector Edward Jorgansen. It was taken well guarded to the Cape of Good Hope and put aboard a warship for London and deposited in the Bank of England.

* * *

Submarine Volcano.—A submarine volcano was formed last summer in the southern part of the Caspian sea. Russian naval officers find it to be in latitude 38 deg. 13 min. 30 sec. N, and longitude 52 deg. 27 min. E., at a distance of 27 miles from the nearest coast. The summit is below the sea level, but the crater—less than 20 feet in diameter—throws up a quantity of mud to a considerable height.

* * *

Engraving on Diamonds.—It was long belived that the diamond could not be engraved with safety or satisfactory results. A few stones roughly engraved were fround in India, and a diamond was exhibited at the Paris Exposition of 1878 on which a portrait of the King of Holland was scratched. A Paris jeweller has now demonstated the fact, however, that the most artistic engraving can be executed on diamonds.

* * *

Electrical Fishing.—The "Elec. Tech.," Feb. 28, states that in Japan very good results were obtained with an electric lamp in the form of a fish which was lowered into the sea about 100 feet and which attracted a large number of fish which could then be easily caught. To catch shark a mackerel was tied to the end of a conductor connected with a source of an induction current of 50 volts, the current being started after the shark had swallowed the fish, the effect being to produce unconsciousness, during which time the shark can be caught and killed.

* * *

Largest Sailing Vessel in the World.—The largest sailing vessel in the world, the four-masted ship May Flint, formerly the trans-atlantic passenger and freight steamship Persian Monarch, sailed from Baltimore for San Francisco on March 11th, with a load of 4,320 tons of coal. The total sail area is 10,000 square feet, and her dead weight capacity 5,000 tons of coal. The ship is 371 feet long over all, and 411 feet in length, including the bowsprit, and 360 feet length between perpendiculars. Her width is 43 feet 1 inch, and depth 25 feet. From the bottom of the ship to the topmost point of the foremast the height is 184 feet.

* * *

A Large Electric Locomotive.—In the March number of the *Transactions* of the American Institute of Electrical Engineers is a description by Dr. Cary T. Hutchinson of a large electric locomotive which has just been finished by the Baldwin Locomotive Works. This locomotive has eight drivers connected rigidly by side bars, making a wheel base of 16 feet, the length over all being about 30 feet. The weight is 133,000 pounds, uniformly distributed on the eight drivers, giving 16,700 pounds on each driver. There are four motors, one on each axle, the motors being built directly on the axle without springs of any kind between the armature and the axles. The machine has a capacity, on a four-hour test, of 1,000 horse-power at a speed of 35 miles per hour.

* * *

Artificial Cotton.—United States Consul Morris, at Ghent, Belgium, in a report to the State Department, describes a new process of making artificial cotton, which has been remarkably successful, the product being much cheaper than the natural cotton and possessing most of its qualities. The basis is wood-pulp, which, by a course of treatment, is changed into pure cellulose and spun into thread, and then woven into cloth. It resembles ordinary cotton. It is not as strong as the natural product. It weaves and works well, and can be dyed as well as cotton. By coating it with paraffine and passing it over glass a beautiful brilliancy may be given to it. Much greater strength can be imparted by parchmentizing, when it acquires a semi-transparency. The cloth wears well and has a good appearance.

* * *

Conveys Sound With Light.—The scientific subject in which Dr. Bell is now giving more time than any other matter of the kind is the transmission of sound by means of light. With the aid of the photophone a vibratory beam of light is substituted for a wire in conveying speech, and he is now doing a good deal of work in his laboratory with the purpose of making the principles of the invention applicable to practical uses. The protophone was first described by Dr. Bell before the American Association for the Advancement of Science at Boston in 1880, and it has since received a great amount of attention by scientific investigators. Since Dr. Bell resumed his researches on the subject he has greatly simplified the apparatus necessary in sending sound vibrations over a beam of light, and it now promises to become useful in many ways.

* * *

An Electric Cane.—A Vienna electric supply house has just introduced a cane containing an electric lamp. It is made of ebonite. The upper half can be taken off, and contains in the head of cut glass the lamp, connected by wires with three small platina-sink elements; the strength of current is four amperes, tension six volts. To fill the battery the lower part is filled with a fluid patented by the inventor, Mr. Vohwinkel, and the two parts are then firmly joined. When the head of the cane is lowered or inclined the lamp emits a brilliant white light, which may be kept up for about two hours. While the cane is carried upright no material is wasted. The fluid can easily be replaced and anybody can refill the reservoir. The weight of the cane is a trifle more than a pound.

* * *

Economy of the Steam Shovel.—The great economy of the use of the steam shovel over that of the hand is thus strikingly shown by a writer in Cassier's magazine; The average laborer can shovel from a bank of fairly loose earth into a car or wagon five feet high not over four cubic yards or six tons per 10 hours, and where the material is at all hard or compact much less than this is accomplished. Assuming a laborer's wages to be $1.50 per day, the cost of loading the cars will be 37½ cents per cubic yard, or 25 cents per ton. If plowing, picking or blasting is necessary, the cost of placing the material on the cars may be $1 per cubic yard or over. The steam shovel, on the other hand, will dig and load as much as 1500 or 2000 cubic yards, equal to from 2250 to 3000 tons, in the same time, and this with the labor of six men, three on the machine, and three to lay its track as it progresses. To do 2000 cubic yards in the same time, at four yards per day per man, would require 500 men, so that with a single powerful steam shovel six men can do the work of 500.

Distinction Between Fraud and Humbug.

THE INVENTIVE AGE is sometimes asked why it does not positively declare this patent agency or that agency a fraud and so answer all enquiries. There is one fact that the inventor should not lose sight of. It does not necessarily follow that a patent agent is a fraud because he does not sell patents that are placed in his hands. If he fulfills his agreements he cannot be proven a fraud. It is one thing to be convinced of the existence of fraud, and quite another thing to prove it. For instance, the average patent agent is cunning. He words his propositions, contracts and letters with great skill. He really does not agree to do much; but the inventor is led to believe he is taking a personal interest in his case.

The patent agent being unable, or at least unwilling, to give the inventor information about recent sales—name of the buyer, seller, amount and date—it must be assumed that *boni fide* sales are seldom made, and the inventor who invests $20 in that direction is in about the same position as the purchaser of a lottery ticket. This much, however, must be admitted: four-fifths of the inventions are worthless and could not be sold through any means.

Our calling a patent seller a fraud will not convince the inventor. He must be satisfied through his own correspondence. If the inventor will spend a few cents for postage and write a few letters he can soon satisfy himself regarding the patent agents. He should ask the agent pointed questions. "Have you sold a patent during the last year? If so, to whom and for whom?" The character of the replies will acquaint the inventor with facts that will surprise him. If he receives a prompt, plain and respectful reply, which is doubtful, giving names and date of sales, then the inventor can extend his enquiries still further. Of course if an inventor is bound to be humbugged there is no escape for him. If a Philadelphia bill poster should write an inventor, telling him that he would post, in big letters, the fact that his invention was for sale on receipt of $20, that would not be fraud but it would be humbug. The fact that these patent agents make few if any sales ought to convince the inventor that their methods are wrong, and that while it might be possible to prove them frauds, they are, nevertheless, humbugs.

Never Will Get Caught Again.

In another column appears the announcement of the arrest of Paul James Gregory, of Marilla and Buffalo, N. Y., indicted in the U. S. court for using the mails for the purpose of fraud. Gregory is one of the most flagrant of patent sharks and although THE INVENTIVE AGE has frequently warned its readers, it is sorry to learn that some of them found his circulars and propositions so enticing and plausible that they have fallen into his trap to the extent of $20 or more. One subscriber in Watertown, N. Y., who wrote to Gregory April 13th begging him to at least acknowledge the receipt of $20 sent to him, had his letter returned, unopened, by the postmaster at Buffalo, marked "fraudulent" in red ink thereon. He now writes THE INVENTIVE AGE as follows: "I don't ever expect to hear from Gregory. If men would report such cases to you promptly, it would be better for all of us. I don't think I will ever be caught again by a shark. If you have not published this man do so at once for the benefit of others."

THE INVENTIVE AGE cannot protect an inventor from buying his experience if he wants to, but one thing is certain it warns him of the sharks that seek to defraud him, and readers of this magazine will at least fall into these pitfalls with their eyes open.

Another Triumph in Ship Building.

The new American liner "St. Paul," another triumph in ship building, was launched by the Cramps, of Philadelphia, on the 10th ult. This vessel is a companion of the "St. Louis," illustrated and described in our January issue. These two vessels when completed will undoubtedly be the finest specimens of ocean greyhounds ever built and it is cause for rejoicing that they are made by an American ship building firm—the largest in the world—from American material, by American labor, with American capital and for an American line, with the stars and stripes at their mast head. The christening of the "St. Paul" was done by Miss Frances Griscom, daughter of Clement A. Griscom, president of the American Line. The length of this vessel over all is 554 feet, 2 inches; extreme breadth 62 feet, 9 inches. Her bow stands 39 feet above water at load draught, and her gross register is 10,700 tons. She will have a capacity for 1,800 passengers and crew. There are 12 water-tight compartments exclusive of ballast tanks and every device known for the safety, convenience and comfort of passengers has been adopted and incorporated in the building of these floating palaces. The launching was attended by a large number of people from the city of St. Paul, and distinguished citizens from all over the country. The Pennsylvania legislature attended the event in a body and 20,000 people joined in the shout of good luck and Godspead as the 7,000 tons of steel, comprised in her unfinished hull, slowly and majestically slid down the ways into the welcome bosom of the Delaware.

Deer Park on the Crest of the Alleghenies.

Machine Rolled Chains.

Consul J. C. Monaghan, at Chemnitz, Saxony, brings to the attention of the State Department at Washington a machine for making chain without welding, which is interesting in view of the efforts in this country and in England to produce a weldless chain, with greater strength and reliability than can be attained with hand-made links. While his description is in no sense technical and is very meager, the illustrations assist to a fair understanding of the process, starting with the "curiously formed" bar. The method of rolling the bar is not explained. We quote from the consul's report: The machine does away with the welded joint and secures uniformity, rapidity, and increased strength in construction. It was brought to my attention during

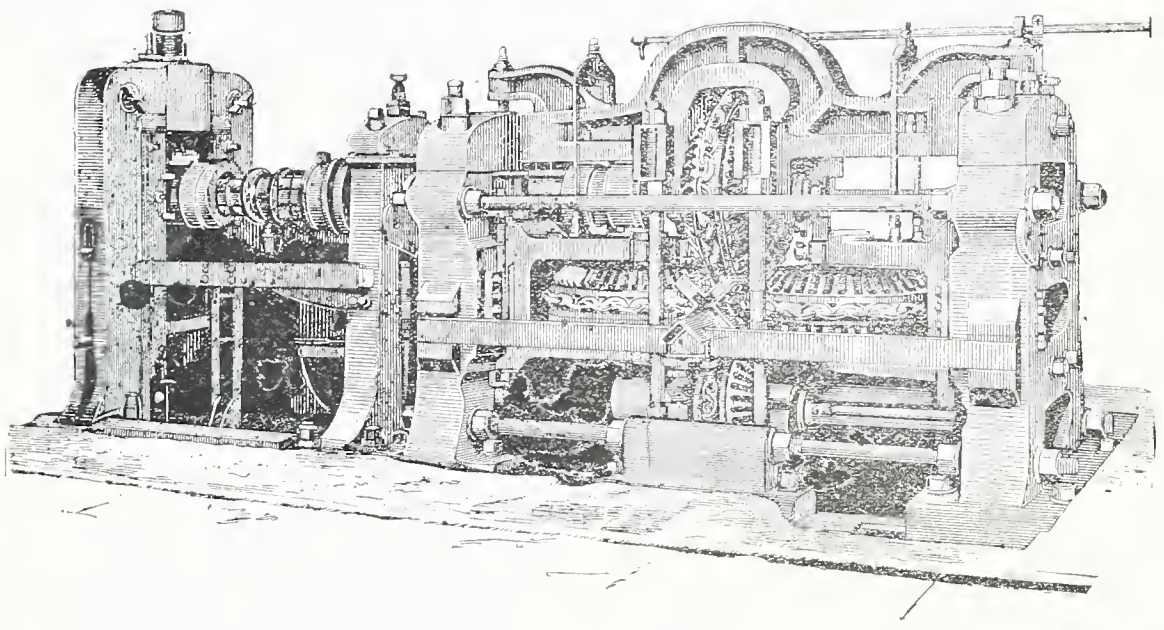


Fig. 1.

an investigation of tin rolling. The new machine resembles somewhat the machine or roll that sinks impressions in hot or steamed wood, *i. e.*, its mode of working is similar. There is, first of all, the roll (Fig. 1) and, second, a peculiarly formed bar of iron (Fig. 2). The rolls are four in number, and are so situated and so arranged that they work simultaneously on the curiously formed iron bar, cutting it into links. A glance at Fig. 1 will reveal much more of the *modus operandi* than any description in words would do. The curves that look like chain links are the highly tempered, *i. e.*, hardened steel dies or cutters. The gears fit into each other and operate simultaneously on the four flanges of the iron bar. At a point just back of the cross, that is, in front of the gears of Fig. 1, the projecting cutters of the gears almost meet. Through this point passes the iron or steel bar at white heat. The gears revolve rapidly, turning out three or four yards of chain per second. The iron bar that goes in looking like Fig. 2, comes out looking like Fig. 3. By means of tongs and cutters, and molds, Fig. 3 is made to look like Fig. 4, in which the links are held together by very thin bits of iron which are easily cut. After some little labor in cleaning the links, the chain is run into a furnace, heated red, and then run through rolls to give its links the shape seen in Fig. 5. It is claimed that this machine-made chain is better than the hand-welded; that it does not require wrought or welding iron, but that it gives better results with fused irons and steels."

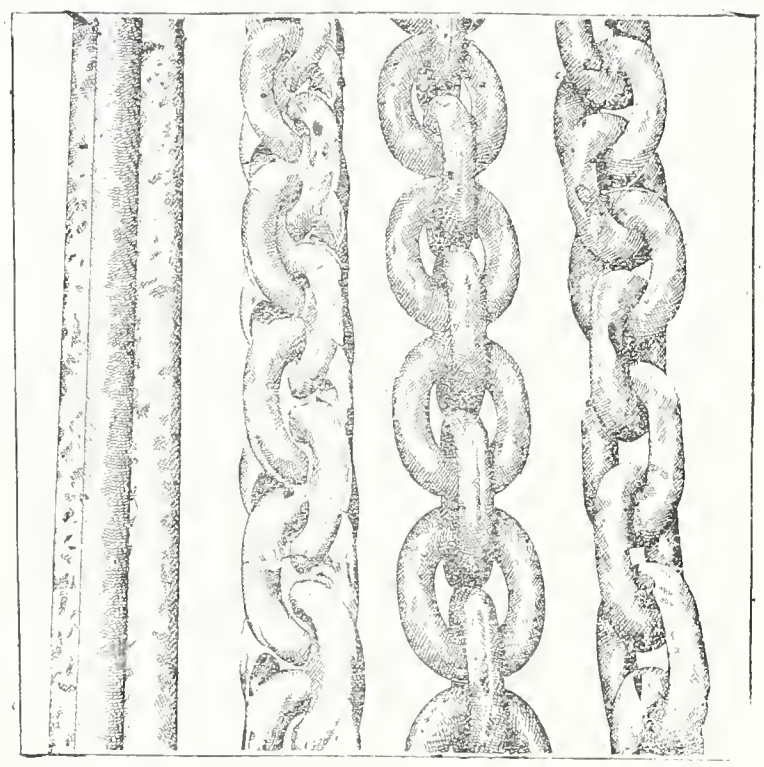


Fig. 2. Fig. 3. Fig. 4. Fig. 5.

A Simple but Useful Invention.

Frequently the simple inventions are the most useful to mankind and not infrequently are of the most value to the inventor. One in mind is that of a blind-slat holding device. It is simply a small spring-steel strip for attachment to the end of one of the slats in a section of blind, which in its action controls the movement of all the slats in that section, and by its friction permits the slats to be maintained in any position desired. In the present blind there is no attachment of this nature and the result is that after a few weeks' use the tenons at the ends of the slats become so loose that it is impossible to control the movement of the slats in regulating the admission of air and light. By the simple invention of Mr. Taylor, of Henderson, Ky., the opening and closing of the slats, or partial opening at any desired angle, can be adjusted with certainty and convenience.

Vindication of the Triple Screw.

One of the events of last month was the practical test of the triple screw as applied to modern war vessels and the result was a splendid vindication of Commodore Melville's judgment. In the practical maneuvering of the American naval fleet off Trinidad the "New York" was the flag ship of the fleet and the speed fixed for the fleet was a 13 knot rate at half boiler power. The "Minneapolis," which possesses the triple screw, later was ordered by the admiral to increase her speed, if possible on the same boiler power, for seven hours from 2 p. m. The result was at once noticeable in favor of the American naval flyer. By sundown, it is reported, the "Minneapolis" had left the fleet hull down, and by 9 p. m., the end of her time limit, the rest of the fleet, even the "New York," were not in it. The "Minneapolis" then reducing her speed, as per orders, to eight knots, it took the rest of the fleet six hours to catch up The coal consumed is reported as follows: 84 tons per 24 hours for the "New York" and 67 tons for the "Minneapolis." The "Minneapolis," at a thirteen knot rate during the cruise, burned twenty tons a day less than the "New York." A fifteen knot rate of speed has crowded the "New York" when it has been mere pastime for the "Minneapolis."

The extensive brick and sewer pipe factories of Akron, Ohio, have resumed after an idleness of over a year.

New Inventions.

Marion B. Monroe of New Orleans, is the inventor of a traction car controller which he claims will safely stop a car going at full speed in four or five feet.

* * *

A practical stone saw is the invention of James Peckover, an expert stone mason and carver. By tests made with the saw, using a chilled-iron shot abrader, and cutting through the hardest of all brownstone, known as the Hummellstown, using a block of stone 10 feet by 6 inches long and 2 feet 2 inches in thickness, the following results were attained. The first cut through was made in one and three-quarter hours, the second with increased speed, in one hour and the third it cut with the full limit of speed, in three-quarters of an hour, which is equal to cutting thirty-three inches per hour. Four inches per hour has been considered good work in the ordinary mills of the country with other saws.

* * *

An English firm has devised a method of manufacturing a perfectly fire-proof celluloid from spent fibers from paper mills. The pulp, consisting of fibers collected from washing water of the paper mill, is subjected to the action of certain chemicals which reduces it to a glutinous state. It is then sent through a centrifugal pump, which gives it an even substance and any shade or color is then imparted to it at the same time by analine dyes. It is then strained through flannel into square boxes, and after a time assumes an almost solid consistency. The celluloid can then be cut into slices, or molded when the composition is in liquid state.

* * *

Two electricans at Gratz, Austria, claim to have invented an arrangement by which a newspaper can be printed by telegraph in any number of places at the same time.

Death of Gen. Henry Capehart.

One by one the old heroes pass away. With feelings of deepest regret we record the death of Gen. Henry Capehart, on April 15, at Fargo, North Dakota. He was a Brevt. Maj. Gen. U. S. V. and served with distinction with Grant, Sheridan, Logan, Custer and other distinguished soldiers all through the war, and only recently was honored by the government with a special medal for brave and gallant deeds in the face of the enemy. Deceased was the father of one of the editors of THE INVENTIVE AGE, now on a business trip in Europe, and of Lieut. Edward E. Capehart, U. S. N., on duty at Torpedo Station, Newport, R. I.

The attempt of a state to control the sale of patent rights is an invasion of national authority. The Supreme Court of Kentucky has recently held, Commonwealth v. Petty, 16 Ky. Law Rep. 488 that an act requiring persons to pay a license tax before selling or offering to sell patent rights or territory for the sale or use of patent rights, was unconstitutional and void; and that a state has no authority to regulate such a sale in any way, the matter being under the exclusive control of Congress. The Court distinguished the patent right or the right in the discovery, from the patented article made by the application of the discovery. It held that the former was an incorporeal right over which Congress, by virtue of article 10 of section 8 of the constitution conferring upon it power "to promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries," alone has authority.

The use of horse flesh for food in the United States is increasing and it will not be surprising if in a few years much of the present prejudice against its use will have vanished. A great deal of horse meat is now being packed for export. A recent Portland, (Oreg.) dispatch speaks of one herd of 3,000 head being killed by one syndicate, the price paid being but $5 a head.

For the first time in five years the production of pig iron in Great Britain in 1894 exceeded that of the United States. The total as reported by the British Iron Trade Association was 7,364,745 gross tons, against 6,657,388 tons in this country. In the preceding year the figures were 6,976,990 and 7,124,502 tons respectively.

The black ostrich stands seven feet high. The speed is that of a horse, and it can carry a man. The cassoway is as large, but has a shorter neck, and feeds on vegetables.

It is estimated that the output of bicycles in the United States this year will be over 400,000, nearly double that of any previous year.

FILMS STRETCHER.

Its Use for Photographic Films and Papers, by Aug. Chr. Kitz, Frankfort am Main.

Everybody who has worked with films and especially rollfilms will surely have sought for a suitable appliance to facilitate the handling of them.

Although these films are now less liable to curl than they used to be, their treatment still requires considerable attention.

The use of films—the stiff ones included—demands more care than the glass plate; this difficulty is especially felt by amateurs and is no doubt the reason why films have not yet been more introduced, although they possess great advantages and have lately become very reliable.

Many amateurs who use film cameras, restrict themselves, as is well known, to the taking of the negative only, leaving all subsequent work to professionals.

For some people this custom may be quite satisfactory, but there is surely this great drawback in this proceeding, that one is generally obliged to delay the finishing of the photos until the whole roll is used up before they are given away to the professional. It may frequently happen that a very long time elapses between the first and last taking, and it cannot be surprising if the results in that case prove unsatisfactory or even if the whole set of negatives prove a failure. Many complaints in this respect have been made and one dare say whoever works successfully with films, must have first found out for himself in one way or another a method to handle the film. Most common I think, is the expedient of placing the film on a glass plate and fixing the same by means of two India rubber bands. This is comparatively easily done, and especially so when using a glove or board in order to quicken this manipulation and to shield the sensitive film from the red light. Should, however, the film happen to slip out of one of the India rubber bands, it will be found rather difficult to bring it back to its former position. Without such a contrivance it will be very difficult to bring the film with one pull into the photographic bath or to remove the same out of it, and constant attention has to be given in order to prevent the film from floating at the surface of the liquid, a thing which so easily happens with this light material. It will further be impracticable to move the film to and fro in the bath in order to dispel fine air bubbles adhering to the gelatine side, or one may have to dip the fingers in the liquid, which will certainly not attribute to cleanliness in work-

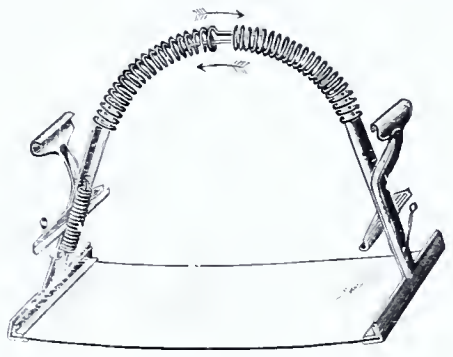


Fig. 1.

ing, on the contrary, it will cause many annoyances, and in the case of amateurs, who do not always possess an efficient washing apparatus (spray), it will render the result doubtful.

In view of these difficulties, different devices have lately been brought out, viz, pincers for roll films and supporting frames for stiff films of certain sizes, etc., but these instruments however useful they may be for certain purposes, do not lend themselves equally well to the manipulation of all kinds of such thin materials, i. e., roll films or stiff films, or papers of different sizes, so that these materials can be easily adjusted, are kept flat and can be handled at least with the same comfort as glass plates.

When experimenting with such like thin materials, I have often vainly tried to purchase some instrument for handling them and keeping straight; at last I have been obliged to get one made to order, which instrument has proved in every respect entirely satisfactory. As this device is a really practical one, permitting of use in many ways in photography, it has been decided to place this invention on the market and therefore patent rights have been secured in all countries where there may be sufficient interest for this novelty.

The stretcher consists of suitably shaped clips to grasp the film or paper with at its edges and of a suitable connecting piece or handle to unite the clips and keep them distended so that the film or paper is kept flat (Fig 1 and Fig 2).

The latter arrangement permits the clips of being quickly separated from the connecting piece, by simply pressing the stems of the latter. The film or paper fixed in the clips can then be put one upon another in a tray (f. i., for turning, fixing, washing, etc.) One can as well hold two sheets at the same time with this stretcher—emulsion side outward.

For drying, the papers or films are suspended at the ears of the clips on pins or one behind the other on a metal strip. The adjustment of the film or paper in the stretcher offers no difficulty whatever. When larger quantities of films in strips are to be

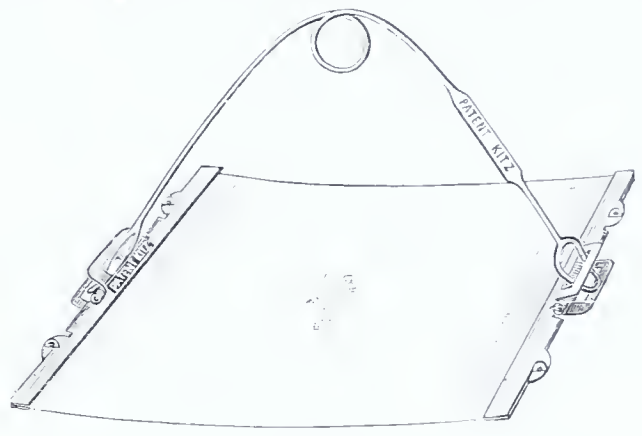


Fig. 2.

located, this work can be facilitated and simplified by the following combination on the same principle (Figs. 3 and 4), the effect of which is that a certain number of films can be treated at one and the same time: The film is adjusted in the clips as above said and is arranged around the axle as shown in Figs. 3 and 4. The axle is placed over a suitably shaped tray T and provided with a crooked handle: by turning the latter the whole strip is drawn through

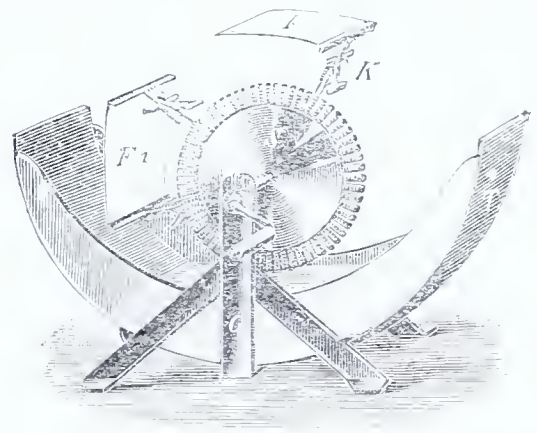


Fig. 3.

the developing bath. This arrangement requires smaller quantities of liquids and permits a very careful control of the state of development and the process can at once be interrupted by lifting the axle out of its cushions.

For this purpose likewise, the clips of Fig. 2 offer considerable advantages. One can place the strip of film fixed at its ends in the clips around a drum-like arrangement similar to Figs. 3 and 4: the ears of the clips can then be connected by means of some contracting device.

It may further be mentioned that some of the roll films, that have a great tendency to curl, can easily be flattened previous to the adjustment in the stretcher (Fig. 5).

Cut two pieces of pure (black) pasteboard to the approximate size of the film. One of these pieces, that which is to serve as cover, should be about one-

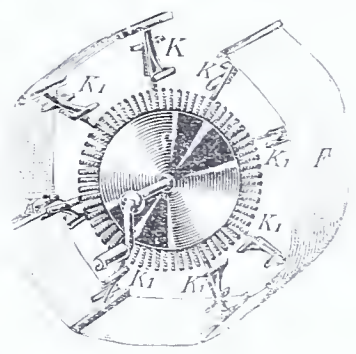


Fig. 4.

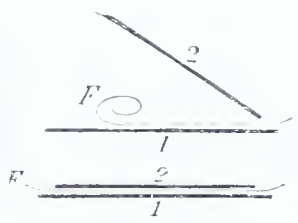


Fig. 5.

fourth less in breadth than the other, so that the film overlaps at both sides, thus facilitating its being grasped at its edges by the clips. Place the larger pasteboard (1) on the table, then press with the edge of the cover pasteboard (2) the edge of the film on board (1), unroll the film and follow with the cover-board gently pressing. This is done in a moment and the film is shielded from the red light.

After this manipulation the pasteboards are dropped.

If preferred, the pasteboards can be united by means of an elastic backing (book cover-like) this cover is then simply clapped over the film before cutting from the roll. In this way the cutting to size is also considerably facilitated.

AUG. CHR. KITZ.

Recent Decisions.

The Standard Folding Bed Company of New York were the assignees for the State of Massachusetts of a folding bed patent owned by the Welch Folding Bed Co., of Michigan. Suit was brought to prevent the Welch Company from selling these goods in that territory. The Circuit Court of that district found for the plaintiff. The U. S Supreme Court now reverses this, the opinion reading as follows: "One who buys patented articles of manufacture from one authorized to sell them becomes possessed of an absolute property in such articles unrestricted in time or place." Chief Justice Fuller and Associate Justices Field and Brown dissented in an opinion read by the latter.

* * *

WHAT CONSTITUTES A PATENTABLE INVENTION.

The distinction between patentable and unpatentable inventions was declared in an opinion read by Justice Brown in the Supreme Court of the United States last month. The case in hand came from the Circuit Court for the northern district of California, involving three patents, for the manufacture of belt pulleys and for the product of that process which Philip Medort et al. alleged has been infringed upon by the Risdon Iron and Locomotive Works. The court below gave judgment in favor of the claimants, and this was reversed. Discussing the claims of the patent for the manufacturer of the pulleys, Judge Brown said:

"That certain processes of manufacture are patentable is as clear as that certain others are not, but nowhere is the distinction between them accurately defined. There is somewhat of the same obscurity in the line of demarcation as in that between mechanical skill and invention, or in that between a new article of manufacture which is universally held to be patentable and the function of a machine which it is equally clear is not. It may be said in general, that processes of manufacture which involve chemical or other similar elemental action are patentable, though mechanism may be necessary in the application or carring out of such processes, while those which consist solely in the operation of a machine are not. Most processes which have been held to be patentable require the aid of mechanism in their practicable application, but when such machine is subsidiary to the chemical action, the fact that the patentee may be entitled to a patent upon his mechanism does not impair his right to a patent for the process, since he would lose the benefit of his oral discovery, which might be applied in a dozen different ways, if he were not entitled to such patent. But if the operation of his devise be purely mechanical, the machine is entirely independent of any mechanical or other similar action. * * * It is equally clear, however, that a valid patent cannot be obtained for a process which involves nothing more than the operation of a piece of mechanism, or, in other words, for the function of a machine."

Regarding the patents for the pulleys produced, Justice Brown said:

"This is a patent only for superior workmanship, and within all the authorities is invalid. This court has repeatedly stated that all improvement is not invention. If a certain service differs from what precedes it only in superiority of finish or in greater accuracy of detail, it is but the carrying forward of an old idea, and does not amount to invention. Thus, if it had been customary to make an article of unpolished metal, it does not involve invention to polish it. If boards had heretofore been planed by hand, a board better planed by machinery would not be patentable, although in these cases the machinery itfelf may be patentable."

* * *

The U. S. Supreme Court affirms the decision of the Circuit Court for the western district of Pennsylvania which found for the plaintiff in the infringement case of Arthur Kirk vs. John E. Dubois. This was an improvement patented by Arthur Kirk in the style of dam known as bear-trap dam, one particular of which consisted of "an open sluice, water way, or tail race, so arranged relatively to the dam that the water which is not required to support the leaves will escape, and so relieve the dam of all unnecessary pressure. Of the invention Justice Brown said: "The Kirk invention is undoubtedly a very simple one, and it may seem strange that a similar method of relieving the pressure had never occurred to the builders of bear-trap dam before; but the fact is that it had not, and * * * that it is a useful improvement can scarcely be doubted." Mr. Justice Field dissented from the opinion in this case.

* * *

When a number of persons have all been engaged in repeated, but unsuccessful, efforts to accomplish a certain result, and one of them finally succeeds in devising the necessary means, and secures a patent therefor, the United States Circuit Court says (Stahl vs. Williams, 64 Fed. Rep. 121) that the courts will not be inclined to adopt such a narrow construction as would be fatal to the validity of such patent.

Inventions by Colored Americans.

Of all the interesting curios to be seen at the Atlanta Exposition, soon to be held at the Georgia capital, the inventions of the colored people of the United States will, perhaps, be the most notable of any of the products sent by this race for exhibition purposes. A thorough search has been made in the United States Patent Office for all the patented devices of the colored folk since emancipation.

The work of arranging this material is in charge of a young colored man, specially appointed by the Board of Management of the United States government exhibit for the Atlanta Fair, and who was associated with the officials of the World's Columbian Exposition in the press bureau. This young man has had a practical experience along the line of selecting practical exhibits showing the progress his people in the mechanical arts, and the visitor to Atlanta will doubtless, when he goes to the Fair, see a number of novel inventions made by the members of the race who a few short years ago were considered so far below the plane of modern civilization as to be wholly incapacitated for work requiring inventive skill.

It is said on good authority that there have been nearly one thousand patents awarded to colored inventors, but not even one-third of that number will be sent to Atlanta, owing to the short period of time elapsing between now and the opening day of the show. The present plan is to prepare a number of large working models of those inventions, illustrative of the inventive genius of the colored people. Mr. J. E. Johnson, the young man in charge of the work, and who has been made a special agent of the Patent Office exhibit for this special duty, contemplates sending about 25 of the most unique inventions obtainable for exhibition purposes. He informs the INVENTIVE AGE that the space allowed for such exhibits has been considerably curtailed, and it may be in the end he will only be allowed room for half that number. This, perhaps, is to be regretted, as it would be interesting to all to see and know that there were displayed such a large number of these patented designs.

Among the twenty-five models intended to be exhibited are: (1) Congressman Murray's (the only colored man in the last Congress) models of Agricultural implements, including a cotton chopper, fertilizer distributer, stalk knocker, combined furrow opener, combined cotton seed planter, reaper, cultivator and marker; (2) McCoy's improvement in steam lubricators; (3) Bell's locomotive smoke stack; (4) Martin's fire extinguisher; (5) Lavelette's printing press; (6) Downing's electric switch for railroads; (7) Hilyer's hot air registers; (8) Chapman's cotton planter; (9) Dixon's car coupling apparatus; (10) Tolliver's propeller for vessels; (11) Ashbourne's biscuit cutter; (12) Nash's life preserving stool; (13) Taylor's rotary engines; (14) Fisher's joiners' clamp; (15) Spear's infantry shield; (16) Johnson's eye protector; (17) Reynold's railroad car ventilator; (18) Bailey's combined truss and bandage; (19) Wood's steam boiler furnace; (20) Wood's telephone transmitter; (21) Blackburn's railroad signal; (22) Benjamin's gong signal chair; (23) Rick's horseshoe; (24) Wormley's life saving apparatus; and (25) Hawkins' improved gridiron.

Hawkin's gridiron is about the first invention patented by a colored person in the United States. Joseph Hawkins, of West Windsor, N. J., is the patentee, and he was awarded letters patent long before the date of emancipation, the time being given March, 1845.

Blackburn's electrical apparatus for the transmission of messages is now used as a part of the Bell Telephone patents, the invention having been assigned to the Bell Company of Boston.

But the most unique of all the inventions which will be placed on exhibition by the colored people is Miss Miriam E. Benjamin's device known as the "Gong Signal Chair." This young lady inventor is at present a medical student in one of the colleges of the District of Columbia. She was born in South Carolina, and educated in Massachusetts. In 1888 the patent was issued to her and soon after an improvement was added in order to cheapen as well as to add to the utility of the appliance.

The invention is one of those useful novelties suitable for chairs in hotels and restaurants, on steamboats or railroad trains. It can also be used in theatres or legislative halls, and for invalids' chairs in hospitals.

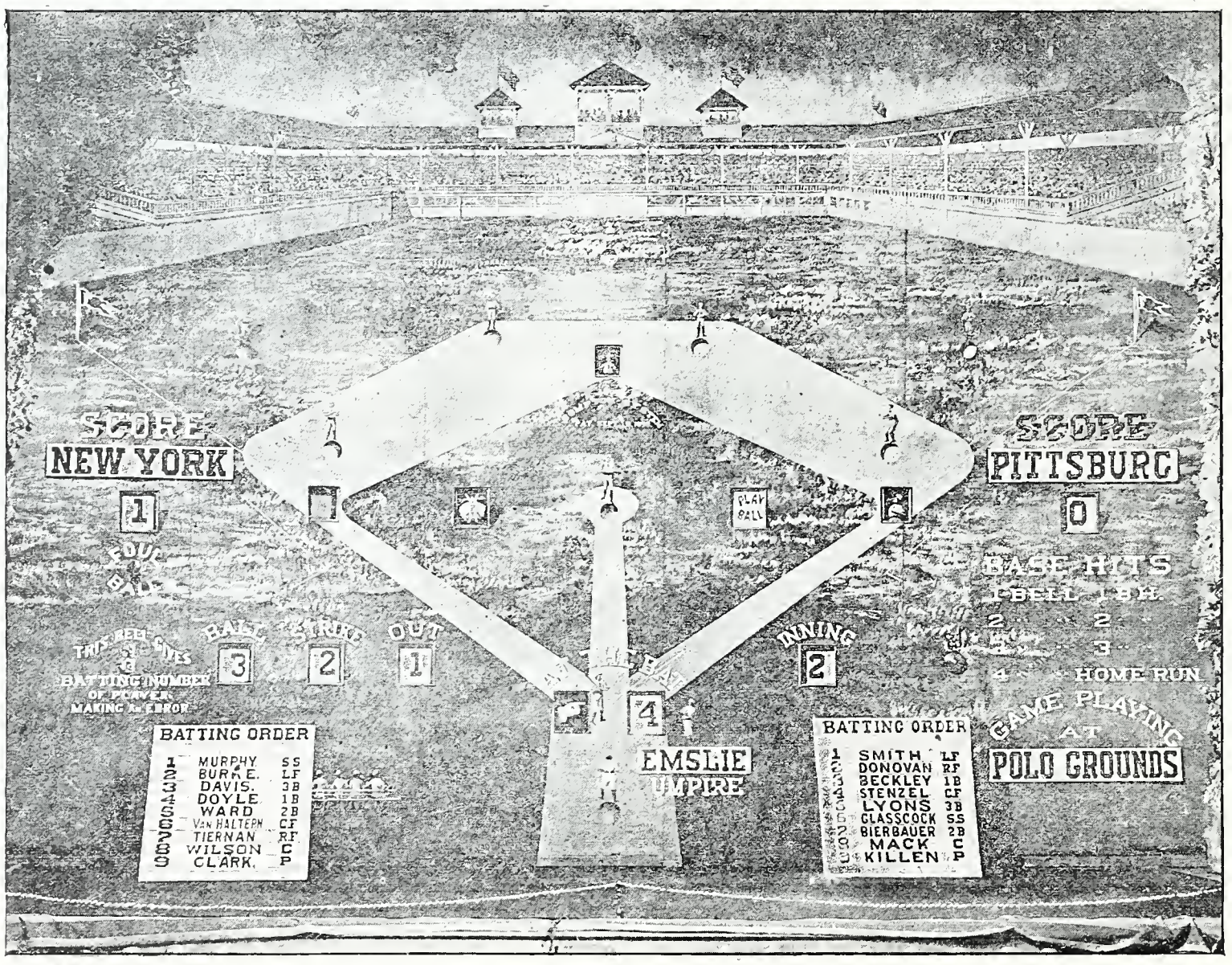
The object of the invention is to mainly reduce the expenses by decreasing the number of attendants usually required for the convenience of guests; also, to obviate the necessity of hand-clapping and loud calling, where the service of a page or waiter is needed. The present system now in vogue is to have one attendant for about every three or four guests. By the use of this invention, it is claimed, one waiter will be enabled to attend to the wants of from twelve to fifteen guests.

In order to procure a large and creditable exhibit, other than inventions, from the colored people of the District, the Atlanta Exposition Board has created the following local commission: Prof. Jesse Lawson, president; T. L. Jones, E. E. Cooper, Henry E. Baker, C. A. Fleetwood, A. F. Hilyer, Mr. I. H. Merriweather, Hugh M. Brown, Geo. W. Cook, W. S. Montgomery and J. E. Johnson.

The Compton Base Ball Reporter.

The large attendance at the opening games of base ball this season indicate that interest in the great national game is not waning. An invention of Melville D. Compton, a Newark electrician, is likely to add still greater interest to the sport for through his ingenius device it is possible to watch the progress of a distant game very much as one observes the races in Edison's kinetograph. The accompanying illustration gives an excellent idea of the invention, which is known as the Compton Electric Baseball Reporter. As the cut shows, a baseball field is painted on a curtain, and apertures are left in the curtain at each playing position and under the words "Score," "Ball," "Strike," "Out," and "Innings." The two teams are distinguished by colors; thus if New York is white and Pittsburgh brown, when New York is at the bat the round apertures under the fielders will be filled by a brown disc, and the other apertures are backed with white, the illustration shows New York in the field and Pittsburg at the bat. The number at the right of the home plate indicates that player No. 4 is batting, while the number at the other apertures outside the diamond show that the inning is the second, the man at bat has had three balls and two strikes and one man is out. The square apertures near the bases indicate a man each on first and second. Should the batter nock a foul a buzzer on the left indicates the fact; if a base hit is struck the bell on the right makes it known, and the batter is represented by a figure in the square hole near the base when he reaches it. When a fly is struck a large "blue-bottle" appears at the opening between the pitcher and third base.

The contrivance is manipulated by an operator who is in communication with the grounds and receives by telegraph the necessary information throughout the progress of the game. In case of a rainy day it saves exposure, and to those who have not time to visit the grounds in fair weather, it is a convenience. This invention has been sucessfully tried in all the large cities, and the inventor has so perfected the system that it is likely to become popular throughout the country.



THE COMPTON ELECTRIC BASE BALL REPORTER.

SCIENCE FOR YOUNG PEOPLE.

Conducted by E. P. Lewis.

The effects of electricity upon the human body are very little understood, especially when we consider alternating currents. The resistance of the human body varies from a few hundred to 8,000 or 10,000 ohms, according to whether the skin in contact with the electrodes is moist or dry. Under ordinary conditions, when the resistance of the body is say 5,000 ohms, contact with electrodes having an electromotive force of 1,000 volts between them is apt to kill. In such a case, only one-fifth of an ampere of current passes through the body. Ordinary conductors, like the metals, have their resistance apparently increased when alternating currents pass through them, owing to the fact that when the alternations are rapid the electricity travels mostly on or near the surface, not through the interior of the conductor. Strange to say, such is not the case, when alternating currents pass through the body, its resistance actually being less in such cases. If the current alternates at a very rapid rate, the current seems to loose its power of affecting the body. Elihu Thomson made an induction coil giving several thousand alternations per second, and with it sent a current through his body sufficient to light a 16 candle power incandescent lamp. The current amounted to about 1.5 amperes, while if a direct current were used, a small fraction of this amount would produce death. Nikola Tesla has without injury touched electrodes at a potential of hundreds of thousands of volts, with a frequency of alternation of several millions a second. His entire body would glow, and an incandescent lamp held in his hand could be brilliantly lighted.

* * *

The spark obtained by discharging a Leyden jar is not itself electricity, but is due to the air being heated to incandescence by the passage through it of the electricity. The duration of the spark is very brief. By making the Leyden jar of the proper dimensions, the period of duration of the spark may be made as small as the one twenty-five millioneth of a second. Prof. C. V. Boys, of England has succeeded in photographing riffle bullets moving at the rate of 2,000 feet a second by the light of such sparks. The bullet passes a few inches in front of the sensitive plate, and when in the proper position automatically discharges the jar and causes a spark. The bullet is as sharply photographed as though it had been at rest, so quickly does the entire process occur.

* * *

No one would think that an electric light could be maintained in water, with apparently nothing between it and the liquid, yet this is possible. If a very heavy current is passed between two metal electrodes immersed in acidulated water, the negative pole will soon begin to glow with an intense light, which seems to form a fiery cylinder arround the electrode. When the current begins to pass, some of the water around the pole is decomposed, and the layer of hydrogen gas formed offers a great resistance to the passage of the current. In overcoming this resistance, the current devolops a large amount of heat, which vaporises some of the water and makes the electrode white hot. The vapor is such a bad conductor that the current will be interrupted. As soon as the electrode cools somewhat, the steam will condense and the current will pass again, and this will be repeated again and again. This cannot be detected by the eye, for the effects succeed each other so rapidly that a steady impression of light is felt by it, but if a telephone is placed in the circuit a continuous sound will be heard, showing that the current is intermittent.

* * *

If chemical compounds of both zinc and copper are dissolved in water, and a weak current is passed through the solution, at first the copper alone will be deposited on the negative electrode. On increasing the strength of the current some zinc will also be deposited, its amount increasing with the strength of the current. Brass is an alloy of copper and zinc and in this way articles may be plated with brass composed of these two metals in any desired proportion. They will be as thoroughly mixed as though they had been melted together.

* * *

Pictet, a French scientist, who has done a great deal of work in the production of low temperatures and the liquefaction of gases, states that by exposing himself for several minutes a day to a temperature of about 100 degrees below zero, he cured himself of a bad case of dyspepsia.

* * *

Some of the older text books on physics state that hydrogen has been liquefied by great cold and pressure. This is a mistake. Olszewski, a Russian chemist, succeeded in doing this for the first time a few months ago. There is now no known gas which has not been liquefied.

The Case Against Holgate.

Since our last issue there have been some further developments in the case of the American Association Inventors, Geo. H. Holgate, manager, Philadelphia. Charges of misconduct have been filed with the Commissioner of Patents looking to Holgate's disbarment from practicing in that department and charges of using the U. S. mails for the purpose of fraud have also been filed with the Postoffice Department. An investigation of the documents upon which the latter charges are brought reveals the following:

L. C. Highsmith, of Canton, Texas, is the inventor of a tool for building wire fence. According to the original documents upon which charges of misconduct are made, Highsmith, after some correspondence, and upon certain representations and inducements held out to him by the American Association Inventors, Geo. H. Holgate, manager, signed certain contracts under date of July 10, 1894. In the contract signed it seems $30,000 was the sum fixed as about the proper figure to obtain for so valuable a patent as Mr. Highsmith possessed. Holgate was also to procure certain English and Canadian patents, and receipted to Highsmith under date of August 6, 1894, for the $25 advance fees therefor. Highsmith hearing no more about the matter, wrote to Holgate and under date of February 12th last received word from Holgate saying among other things that "we made application in England and Canada, but both too late. We prepared both cases but they were received too late. *But the fees were received just the same.*"

Highsmith was suspicious of misrepresentation and wrote, under date of January 10, to the English Patent Office in London and also to the Canadian Patent Office asking if such cases had been filed. Under date of February 15th the London office replied saying that *no such application had been filed during the past year*, and the Canadian office replied that *no such cases had been filed during the eight months previous.*

Now The Inventive Age desirers to be absolutely fair, just and reasonable in the criticisms and in its conclusions regarding Mr. Holgate and all other patent agents who are just now being investigated by the public press and the government officials. Mr. Holgate was in Washington last week and declares that he will be able to explain everything satisfactory and that he is guilty of no misconduct. The Inventive Age will in due time publish the result of the pending case in which all inventors are so intensely interested.

Messrs. Pumphrey & Hincken, former employees of Mr. Holgate, are now engaged in business in Philadelphia. They denounce the methods pursued by Holgate in no uncertain language, and Holgate in turn denounces these gentlemen. They all give good references and that the truth will come out and all the facts laid bare is only a question of time.

There are now great discrepancies in the statements of these gentlemen. For instance Holgate says that "Mr. Pumphrey came from Washington, ragged and poor with no place to stay, and the writer (Holgate) went security for his clothes, his board, house rent, coal bills, furniture, and for the shoes on his feet, the majority of which he has had to pay for," and in reply to this charge Mr. Pumphrey says that Mr. Holgate's charges are false; that he left a good position, induced to do so only by the offer of an increased salary of $100 a month from Holgate. He refers to his former employers in Washington.

Another discrepancy we may briefly refer to at this time. Under date of October 25th last Holgate wrote an inventor, W. W. King, Lewiston, Me., as follows: "* * * We care nothing for The Inventive Age or their remarks, as we can buy and sell off a dozen just such concerns as theirs. * * * *We sold five patents last week*, and will serve you to the best of our ability if you place your business in our hands."

Under date of the 1st inst. Mr. Pumphrey writes: "* * * As to patents being sold by the Association American Inventors, the writer, who had full charge of the business of this concern, that is the preparation but not the filing of applications and who was in a position to learn of any sales made, states, without hesitation, that *but one patent was sold* (the sale amounting to about $400) *during eight months, beginning June 1, 1894.*"

It is possible, in fact quite probable, in view of diverse statements above that somebody—to be real polite—is mistaken. Now it is possible that all these matters can be explained and that is just what the inventors of the country want. Their desires will be gratified as soon as the evidence in pending cases has been sifted out.

If the charges against Mr. Holgate are not substantiated then it will be admitted that so far as the patent soliciting department is concerned there is no fraud. Regarding patent selling The Inventive Age has had much to say in previous issues. Mr. Holgate now states that he is no longer sending out those circulars declaring certain sales made "in the last few days" and other circulars of a similar misleading character. If so, we have at least accomplished a little reform in the methods of patent selling. Now if Mr. Holgate shows that he made sales (as in his letter to King for instance), then it must be admitted that his agency really offers the inventor some opportunity of drawing something besides a blank in the great lottery of patent selling.

Not New.

Editor Inventive Age: In the last issue of the Age I noticed two French inventions supposed to be new, but both of which are quite old.

Boilers for generating steam by injecting a spray of water, have long been known, and many patented. It was first devised by Perkins, an American, who also devised the system of heating buildings by hot water. I took out a patent years ago for a party in Chicago for a boiler operating on this plan, but such boilers for obvious reasons have not proven a success.

The other idea, that of using larger rotating drums to propel steamboats was devised years ago, by W. T. Steiger of this city. He proposed to make the drums of such a size that their buoyancy would nearly support the boat above the water, so that as he said, they would act as wheels to convey the boat on the water, instead of forcing it through the water, the same as the Frenchman. He also proposed to cool cities, not by bringing cold air from the north pole through a tube, as recently suggested, but by drawing it down from above, by immense rotary fans, operated by steam engines. He went so far as to figure it all out on paper, giving the size of the fans, the power of the engines and the amount of coal required for the city of Baltimore, his former home.

Theoretically, these and kindred schemes are possible, but practically they are a failure, as any one can see. In his case, they simply served to amuse him in his spare hours. W. C. Dodge.

Washington, D. C.

Review Table.

A Hand Book of Louisiana, is the comprehensive title of a little booklet recently issued by the State Immigration Association. The author is Prof. Wm. C. Stubbs, director of the State Experimental Stations.

* * *

In order to obtain a supply of high class stories the Chicago Record makes the remarkable offer of $20,000 in premiums—the first prize being $10,000. The stories submitted in this competition are required to be "stories of mystery," in order that readers may be offered prizes for guessing the solutions of the mysteries in advance of their publication. There are twelve cash prizes in all and all stories accepted, whether drawing prizes or not, will be paid for. This is one of the most remarkable offers for literary merit ever made by a daily newspaper.

* * *

Under its new management the Mining Review of Denver Col. has come to the front as one of the leading mining magazines of the West. Its editor is J. D. Dillenback and Henry A. Ladd is business manager.

* * *

The Street Railway Gazette, has been purchased by Mr. W. J. Johnston publisher of the Electrical World, and will hereafter be issued each week from 253 Broadway, New York. The Gazette, which is the only weekly street railway journal in the world, was established in 1886, and for the first six years was published monthly. Since 1892 it has been issued every week. Mr. Clarence E. Stump, general manager of the paper, and Mr. J. W. Dickerson, the editor, will still be connected with it under the new management. The new management promises some changes and improvements in the Gazette, which will doubtless be forthcoming.

* * *

The tourist who has been all around the world—who has explored the famous resorts of all lands—unhesitatingly declares that the two most satisfactory summer tours—and both can be consolidated into one if desired—are those of the Yellowstone National Park and Alaska, the "land of the midnight sun." To reach them one is surrounded by inexpensive and unexcelled luxuries in rail and steamship travel. The Passenger Department of the Northern Pacific Railway Company, St. Paul, has recently issued a beautifully illustrated brochure, in which Mr. Olin D. Wheeler, the versitile author, describes the salient features of these intensely interesting spots. The pamphlet also contains a graphic description of the author's ascent of Mount Rainier, that lofty mountain whose perpetually snow-capped peak towers above Puget Sound to the height of 14,444 feet. Mr. Wheeler is a charming writer and besides furnishing interesting data for the tourist, "Sketches from Wonderland" will be found an exceedingly valuable acquisition to the library of travel and history. It can be obtained by sending six cents in stamps to Chas. S. Fee, General Passenger and Ticket Agent, N. P. R., St. Paul, Minn.

TIPS TO INVENTORS.

The Infancy of Invention.

As capital is constantly being invested and expended to protect and preserve capital previously expended and invested in various enterprises all over the land, so will inventions continue—their variety and multiplicity being demanded to further the usefulness and perfection of inventions previously originated.

It was Edison who, replying to the question, "Do you think that the inventions of the next fifty years will be equal to those of the last?" said: "I see no reason why they should not. It seems to me that we are at the beginning of inventions." The truth of this prediction is illustrated in the many useful and wonderful achievements of Mr. Edison's own laboratory since giving utterance to this statement only a short time ago.

Profits from Invention.

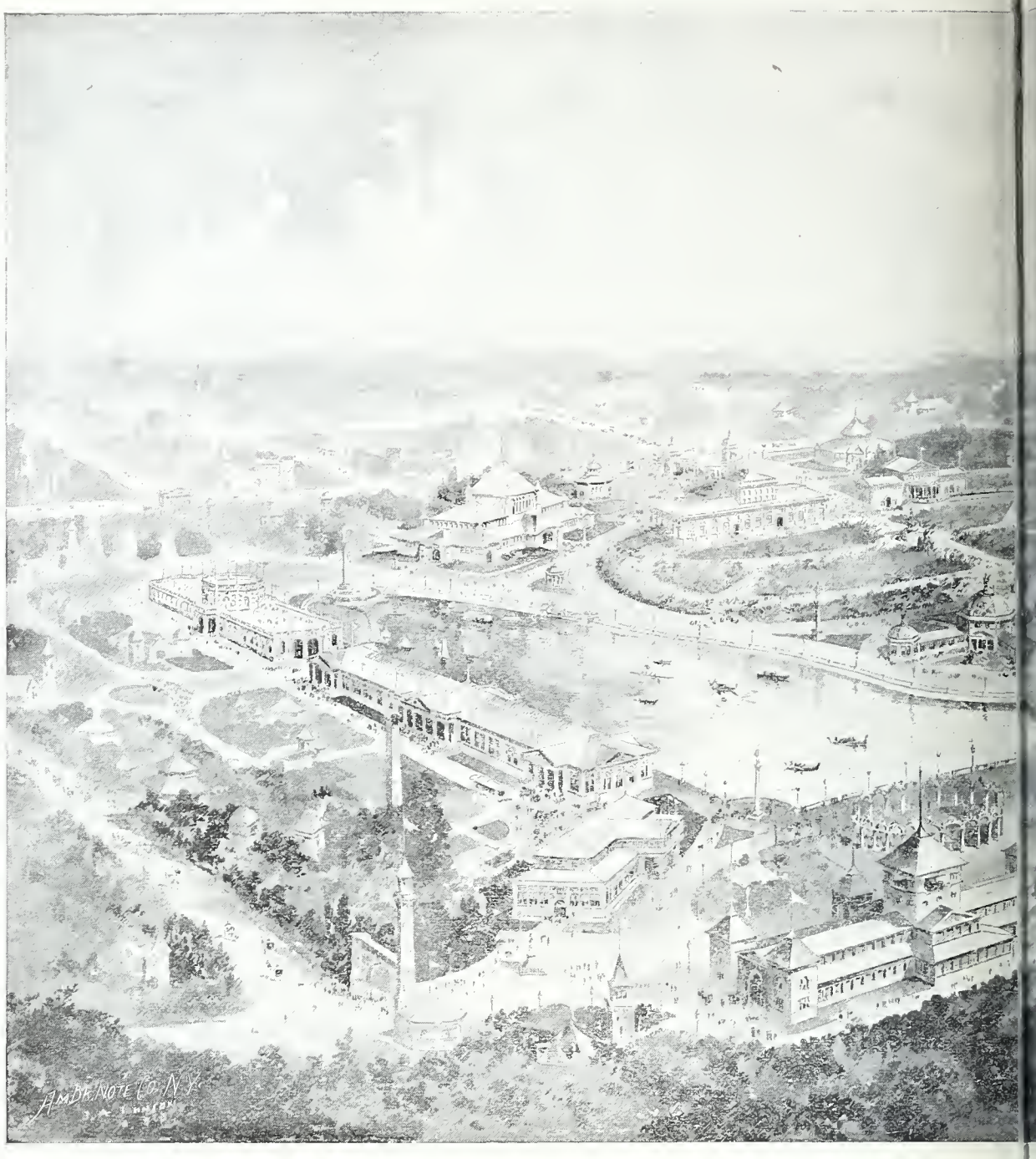
The value of an invention is determined by no fixed rule. Fabulous sums have been made from simple and novel, as well as complex and useful, inventions. It is a fact that four-fifths of the business of the United States is transacted by the use of inventions. The benefits to mankind because of inventions, are so manifest and so common we are apt to look upon them in a matter-of-fact sort of way and fail to give the inventor the credit due him. In the majority of cases, however, the failure of an inventor to reap a reward is attributable to his own negligence, lack of forethought and indiscretion.

Nearly every human being is an inventor, but only a few obtain a *monopoly*—a patent—on the product of their brain. There are thousands of really useful articles, appliances and discoveries in use every day by millions in all walks of life, that might have been patented had the inventor possessed the business sagacity that has actuated his more fortunate neighbor. Take for instance the open slot necessarily used in all conduit electric, or cable street railway systems. The inventor failed to get a patent on the idea and a fortune missed him.

There is money in inventions, but not always for the inventor.

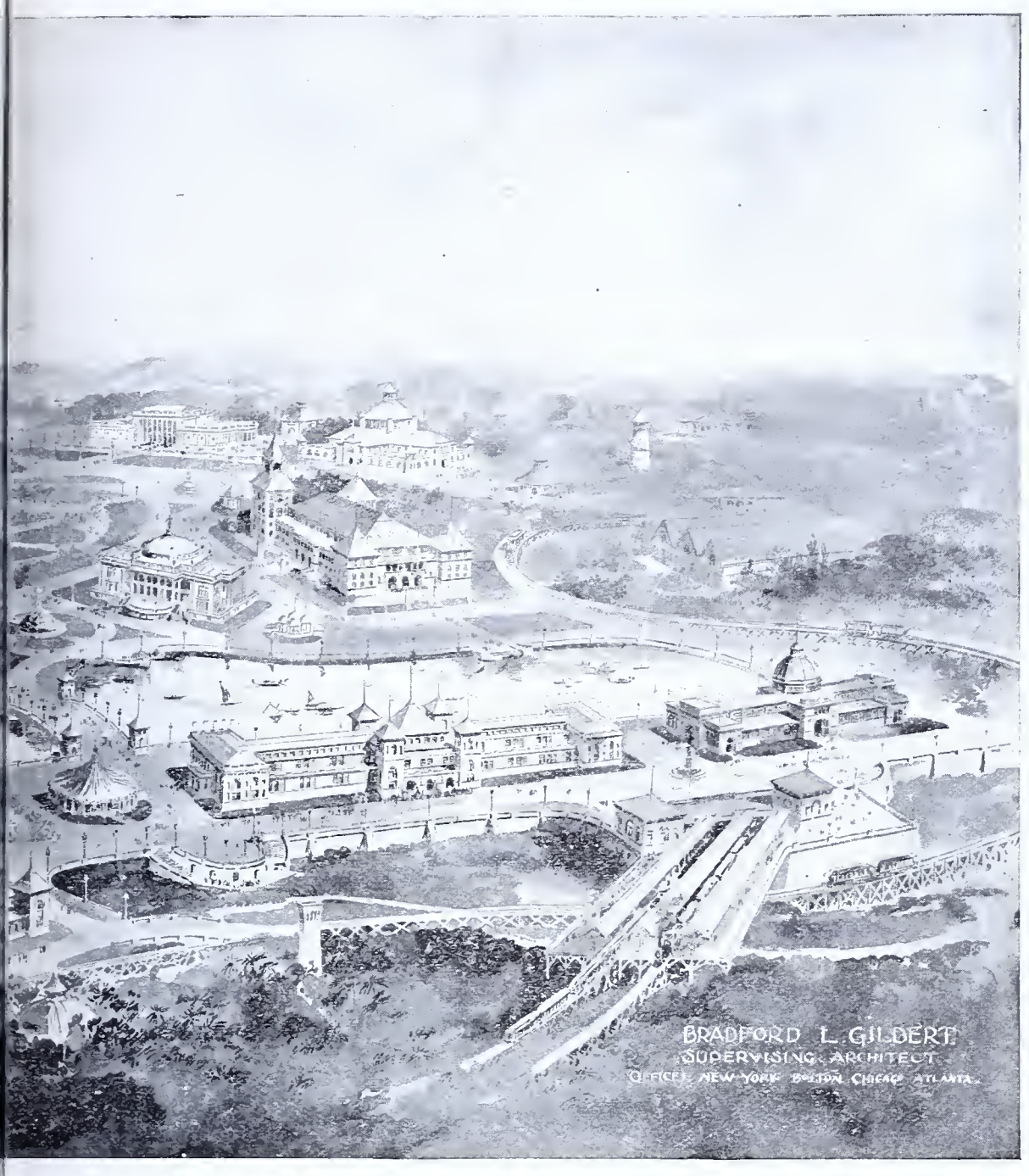
The only way to make money out of an invention is through the protection afforded by a patent; not a patent in name only, but a *good patent*—one that is intelligently drawn, with claims commensurate with the scope and importance of the invention.

The profits arising from inventions in the electric field during the past twelve years have been simply astounding. In railway appliances, bicycles, typewriters, telephones, cash registers, slot machines and farm machinery, the field has been equally remunerative. And just think of that simple toy "Pigs in the Clover"—it netted the inventor, whose friends laughed at him for obtaining a patent on so simple a toy, over $150,000. The inventor of the metal plates to be attached to the worn heels of shoes (for sale in all cities) realized a fortune out of it amounting, it is said, to nearly $1,000,000. Perforated wooden seats for chairs and rubber tips for lead pencils brought the inventors big results. Howe made a million dollars from his sewing machine attachments, and the inventor of that simple lamp attachment, the inverted glass bell, to be suspended over lamps to protect the ceilings from being blackened, made the inventor rich. The "Darning Weaver," a device for repairing stockings, is a useful invention and is netting the inventor a handsome revenue on royalties. The wire nail and gimlet-pointed screw are fortune makers, and wire nails caused the invention of automatic machinery that manufacturers them so cheaply it does not now pay the carpenter to spend his time in picking a nail



BIRD'S-EYE VIEW OF COTTON STATES AI

ELECTRICITY BUILDING, ATLANTA EXPOSITION.



INTERNATIONAL EXPOSITION, ATLANTA, GA.

up when it drops, if it requires ten seconds to do so. The inventor of the well-known "safety pin" lived in luxury all his life, after discovering a means of concealing the point of a pin in such manner as to prevent scratching. The inventor of roller skates made nearly a million and the inventor of the needle-threader for a long time made $10,000 a year.

Relation of Capital to Invention.

Mr. Edward P. Thompson, one of the most entertaining writers on the subject of invention, says that "every invention, before the introduction into practical use, passes through two stages; namely, mental and physical"—mental when in the mind of the inventor only, and physical when the mental invention is put into bodily form by hand, or by hand with the assistance of a convenient tool. "A mental invention," says the writer, "sometimes does not become a physical invention because the inventor lacks money, technical knowledge or diligence. Such a mental invention often becomes a physical invention by the assistance of a capitalist, an educated person, or diligent companion." This being true the *mental* inventor, the person who, for lack of means possibly, would fail to make his invention a physical reality—such a person should take into his confidence a friend or companion to share the prospective benefits of his invention. Thousands of meritorious mental inventions are never worked out because of the over-timidity of the inventor, his exagerated greed for *all* the benefits to accrue instead of half the loaf, which in many instances is, or would have been, ample reward. Mr. Thompson truly says: "Inventors and capitalists should be more willing to co-operate. It is too often the case that the former must pay for his own experiments and all patent costs before a capitalist will even take the trouble to look into the merits of the alleged invention. On the other hand it is too often true that the capitalist seeks to join with the inventor, but the latter wants too high a price at the beginning."

Who Can Apply for Patents.

Patents are issued to any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or new and useful improvement thereof, not known or used by others in this country, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned; and by any person who, by his own industry, genius, efforts and expense has invented and produced any new and original design for a manufacture; any new and original design for the printing of fabrics; any new and original impression, ornament, pattern, print or picture to be printed, painted, cast, or otherwise placed on or marked into any article of manufacture, or any new, useful and original shape or configuration of any article of manufacture, the same not having been known or used by others before his invention or production thereof, nor patented or described in any printed publication, upon payment of the fees required by law and other due proceedings had.

If it appears that the inventor, at the time of making his application, believed himself to be the first inventor or discoverer, a patent will not be refused on account of the invention or discovery, or any part thereof, having been known or used in any foreign country before his invention or discovery thereof, if it had not been before patented or described in any printed publication.

Joint inventors are entitled to a joint patent; neither can claim one separately. Independent inventors of distinct and independent improvements in the same machine can not obtain a joint patent for their separate inventions; nor does the fact that one furnishes the capital and another makes the invention entitle them to make application as joint inventors, but in such case they may become joint patentees. The receipt of letters patent from a foreign government will not prevent the inventor from obtaining a patent in the United States, unless the invention shall have been introduced into public use in the United States more than two years prior to the application. But every patent granted for an invention which has been previously patented by the same inventor in a foreign country will be so limited as to expire at the same time with the foreign patent, or, if there be more than one, at the same time with the one having the shortest unexpired term, but in no case will it be in force more than seventeen years.

Protection to Inventors.

What is a patent? It is a monopoly or grant, in the United States, for a term of seventeen years, to the patentee, his heirs or assigns, of the exclusive right to make, use and vend the discovery throughout the United States, as the inventor's rights may appear in the specifications and patent granted.

This means a great deal to the inventor who has secured a *valid* patent containing all the claims so worded as to prevent infringement and loss in contest. Thousands of inventors, obtaining patents through unreliable and inefficient attorneys or agents, find themselves possessed of patents *in name only*, and of no value when combatted by infringers with capital and the aid of able legal talent. A good patent costs no more than a weak and worthless one. Therefore how shortsighted are those inventors who employ cheap attorneys, saving $5 or $10 in fees, only to find themselves loosers of *all* they have paid when the contest comes.

The Need of Reliable Attorneys.

The Revised Statutes of the United States provide that "before any inventor shall receive a patent for his invention, he shall make application therefor in writing to the Commissioner of Patents, and shall file in the Patent Office a written description * * * of the same in such full, clear, concise and exact terms, as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct and use the same; and in case of a machine, he shall explain the principle thereof and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions."

To carry out these provisions it is necessary for the inventor to first make a clear, concise and complete drawing, or a working model of his invention or discovery, and send it to THE INVENTIVE AGE, or some thoroughly reliable attorney, who, before making application for the patent, should make a thorough and rigid examination of the Patent Office to determine upon its novelty or patentability. If the invention has been anticipated by some one else, or if it lacks novelty, or if for any reason a patent can not be granted, or, if granted, would be of no worth or value, then the inventor does not want to incur the expense of making application and paying attorney's fees and government fees. For making this thorough examination THE INVENTIVE AGE and all reliable attorneys charge $5, which fee is, under some circumstances, however, taken out of the additional fees paid by the inventor in case letters patent are applied for. The fees of patent attorneys vary somewhat, but the average fees for obtaining a United States patent are about $60—the government fees being $15 on filing the application and $20 on issuing a patent—the balance being the fees for preparing specifications, making searches, etc. The inventor is sometimes favored in terms given for payment of the fees, more detailed information regarding which can be obtained by enclosing a 2-cent stamp with enquiry to THE INVENTIVE AGE, Washington, D. C. The reason why the inventor should have a preliminary examination of the Patent Office made before applying for a patent lies in the fact that if the case is rejected the fees paid to the government and the attorney, amounting usually from $55 to $100, are lost.

All patents obtained through us will receive special mention in THE INVENTIVE AGE and in cases of unusual merit inventions will be illustrated free of charge to our clients.

This publication, reaching capitalists, manufacturers and business men throughout the world, is of value in assisting to bring an invention before the public in case its promotion or sale is desired by the patentee.

CLASSIFIED LIST OF PATENTS.

Hereafter we will send, postpaid, to any address, printed copies of any United States Patent, with specifications and drawings, upon receipt of 20 cents for one copy; 35 cents for two copies; 50 cents for three copies. The address of any patentee sent to any address on receipt of 2-cent stamp. Any subscriber interested in any line of invention will be furnished with list of patents granted in same line during and particular period at nominal cost.

PATENTS GRANTED APR. 2.

Advertising and vending machine.
Advertising device.
Air forcing device.
Amalgamator.
Automatic coupling.

Baling press.
Banjo.
Bedstead.
Bicycle.
Bicycle pedal toe clip.
Bicycle support, portable.
Billiard cue.
Binder for pamphlets, temporary 2.
Blind catch, window.
Block signal, electric 3.
Blower, screw pressure.
Boiler.
Boiler case, heating.
Boiler furnace.
Boilers, low water signal for steam.
Book lock.
Book, memorandum.
Bottle filling machine.
Bottle hand protector.
Bottle stopper and mount.
Bridge, truss.
Buggy top raising and lowering apparatus.
Burial caskets, making composition.
Burial derrick.
Button, cuff.
Button, separable.

Calipers, micrometer.
Can oil and protective covering.
Car brass.
Car controllers, switch for street.
Car coupling 6.
Car fender 4.
Car ventilator.
Cars, safeguard for.
Cars, electrical propulsion for Ry.
Cars, trolley support for.
Carbon dioxid, process of expelling
Carousel and panoramic apparatus
Carriage curtain hanging device.
Cart, road.
Cartridge belt.
Cartridge loading machine.
Chain, sprocket.
Checkrein.
Checkrein holder.
Cider, compound for making.
Cigar stamping apparatus.
Cigarette machine.
Clasps for armlets, bands, etc.
Cleat for electric wiring, self locking
Clock winding mechanism, electric
Cloth napping machine.
Cloth pressing machine.
Clothes reel.
Cob stacker.
Collar, horse.
Combination lock.
Composition of matter.
Compound engine 3.
Conductors, terminal attachment for flexible.
Converter bottom.
Conveying apparatus.
Conveying apparatus, overhead.
Cooking fried cakes, implement for
Cotton in form of silver, machine for preparing loose.
Couch.
Cover fastener.
Cover or stopper for milk cans, etc
Crate, poultry.
Cultivator.
Curling iron
Curtain pole.
Curtain roller.
Cutter bar.
Cycles, means for securing cranks and sprocket wheels to pedal shafts of.

Dental chair.
Depurator.
Detergent compound.
Dish cleaner.
Ditching machine, tile.
Dock, balanced floating.
Door hanger.
Dough dividing machine.
Dredging apparatus.
Drier.
Drill clamp
Dye, black, blue and blue black.
Dynamo driven from axles of cars

Edge burnisher.
Electric battery.
Electric controller.
Electric controllers, contact finger for.
Electric generator and current director, combined dynamo.
Electric machine, dynamo.
Electric machines and motors, brush holder for dynamo.
Electric mercurial switch or contact maker.
Electrical transformer.
Electrolysis.
Elevator safety device.
Elevators, electrical controlling system for.
Engine reversing gear, steam 2.
Envelope.
Envelopes, apparatus for dispensing
Excavator bank spud.
Exhaust muffler.

Fastening.
Feed water heater.
Fence post.
Fence stay, wire 2.
Fence weaving machine, wire.
Fence, wire
Fence wire coupling device.
Fender or life guard.
File box.
Filter.
Firearm, magazine.
Fire escape 2.
Flash light apparatus.
Flower package.
Fluid meter.
Flushing drain pipes of sinks, etc., connection for 2.
Fork.
Furnace.
Garment supporter.
Gas and air mixer.
Gas, apparatus for mfg. of oil and water.
Gas machine, hydrogen.
Gas pressure governing apparatus
Gas regulator.
Gate spring.
Gig mill.
Glue and making same.
Grain binder.
Grain binder knot tying mechanism
Grain drying apparatus.
Grill fret work, extension.
Guitar.
Guns, apparatus for filling cartridge feed belts for machine.
Guns, ejector mechanism for breakdown.

Hair straightener.
Hame hook.
Hammer, drop.
Hammock supporting frame.
Handle for fire irons and implements.
Harvester binder.
Heat supplying apparatus.
Heaters with hot water, apparatus for supplying railway storage.
Heating apparatus.
Hoisting apparatus.
Hop picking machine.
Horse driver and governor.
Horse leg protector.
Hose coupling 2.
Hurl stemming and sorting machine
Hydrant, wall.
Hydrocarbon burner.

Incubator.
Ingot pusher.
Injector.
Insect powder blower.
Insecticide distributer.
Instrument for penetrating darkness, haze or fog.
Insulation of electric conductors, means for the.
Insulator pins, machine for making
Ironing machine.
Irrigating dam

Jar holder.

Knitting machine 3.
Knob lock.

Lacing hook and fastening.
Lamp globe shade, incandescent.
Lamp, signal.
Lamp socket, incandescent.
Last block fastener.
Lasting machine nipper jaw.
Lathe, screw cutting.
Lathe tool post.
Lathing, metallic.
Leather, treating.
Lock.
Locomotive 2.
Locomotive ash pan bottom.
Log carrier.
Loom.
Loom reed.
Loom warp stop motion 2.
Lubricator.

Magazine camera.
Mailing machine.
Manhole cover.
Manure spreader.
Match safe.
Measuring device.
Measuring liquids.
Metal working tool for turning axles
Micrometer.
Mining machine.
Miter box.
Molding, finishing.
Mowing machine cutter bar.
Muscle tester.
Music box damping mechanism.
Musical instrument, multiplex stringed.

Nipple cutting machine.
Novelty box.
Nozzles, mechanism for operating exhaust.
Nut lock 5.
Nut roasting apparatus.
Oil stone holder.
Organ coupling, electric.
Organs, electrically controlled magnet and valve for pipe.
Organs, electro magnet for pipe, etc. 3.
Ovens, automatic gas or light regulating attachment for bake.

Packing machine.
Packing, steam.
Padlock.
Panoramic cabinet.
Pelt plucking machine.
Pencils, etc., rubber tip and point protector for lead.
Picture frames, hanger for giving inclination to suspended.
Plane.
Plow, riding reversible.
Pole, adjustable vehicle.
Polishing machine.

Potato digger 2.
Precious metals from solutions, receptacle for recovering.
Preserving jar 2.
Printing from stencils, apparatus employed in.
Prisoners from escaping, device for preventing.
Pump, self measuring oil.
Pumping apparatus.

Radiator.
Rail brace.
Railway, cable.
Railway, conduit electric.
Railway gate.
Railway supply system, electric.
Railway switch 4.
Railway switch work 2.
Railways, closed conduit system.
Railways having sectional conductors, safety device for electric.
Railways, supply for electric.
Rasin seeder.
Recording distances, gradients, and angles, apparatus for.
Reed board.
Refrigerator car.
Retorts, cleaning.
Revolver ejector.
Rubber wheel, split.

Saddle, harness.
Sash fastener.
Sash frame and ventilating sash.
Sash holder.
Saw gage device.
Saw handle.
Saw, scroll.
Sawing lumber, machine for edge.
Seal lock.
Semaphore.
Sewing looped fabrics, trimmer and raveler for machines for.
Sewing machine.
Sewing machine for attaching loops to fabrics.
Sewing machine threading device
Shade roller bracket.
Sharpener, lawn mower.
Sheet metal can.
Shocking machine.
Shoe protector.
Show case.
Sieve cut off.
Sifting apparatus.
Sizing textile fabrics, machine for
Slat weaving machine.
Slips or sheets of paper, device for holding and distributing.
Snow sweeper.
Soaps, making resin.
Socket wrench, reversible.
Sole channeling machine.
Spool or bobbin.
Spout, sap.
Spraying potato vines, apparatus for
Spring seat.
Sprocket wheel.
Steam engine, compound.
Stone engraving machine.
Stove board.
Stove, lamp 2.
Straw stacker 3.
Street sprinkler.
Street sweeper.
Stump puller.
Switchboard, electrical.
Switch interlocking mechanism.
Switch stand.
Switch working mechanism.

Telephone 2.
Telephone system 2.
Telephoning apparatus.
Thrashing machine, bean.
Tile casing for windows, doors, etc
Tire, wheel
Track structure.
Train order box.
Transplanter.
Tree measurer, etc., fruit.
Tree protector.
Trousers protector.
Trousers waistband.
Truck.
Truck for cars, etc., antifriction.
Truck frame.
Truss.
Tug, shaft.
Type writer cabinet 2.
Type writing machine attachment

Umbrella and fan.

Valve 2.
Vending machine.
Veneer work.
Violin, piano.
Vise.

Wagon brake 2.
Wagon, dumping 2.
Washing machine 2.
Washing piece goods, apparatus for
Water closet flush tank.
Water from channels, etc., device for stopping and turning.
Water lifting apparatus.
Water motor 2.
Water sprinkler.
Weather strip 2.
Welding machine, pressure.
Whip socket 2.
Winding machine, cop.
Windmill regulator, automatic.
Wire bundling machine.
Wire rod reel.
Wire stretching device.
Wire winding and distributing machine.
Wrapper 2.
Wrench 3.
Wrist testing machine, coin controlled.

APRIL 9.

Advertising article.
Aerator for distilled water.
Air brake,
Amalgamating and separating metals.
Animal elevating apparatus.
Arc rupturing device.
Auger, earth.
Autographic register.
Automatic gate.

Ballast, feeding machine for making
Bandage machine.
Battery system, electric.
Bearing for vehicle wheels, ball.
Bed, folding.
Bicycle.
Bicycle saddle 2.
Bicycle shoe.
Bicycle supporting brace.
Bicycle wheel rim.
Binder.
Blind, window.
Boilers, device for preventing incrustation of.
Book, duplicating memorandum or copying.
Bottle.
Bottle or egg carrier.
Box staying machine.
Brake beam.
Brush machine.
Bullion sampler.
Burner.
Bushing valve and faucet attachment for casks.
Button hook attachment for shoes, gloves, etc.
Button loop.

Cable grip and lock, combined.
Can or box head crimping machine
Car attachment.
Car bolster.
Car coupling 7.
Car draw bar.
Car fender 5.
Car, self discharging 2.
Carding engine.
Carding engine condensing roll
Carpenter's bench.
Carpet stretcher.
Cartridge, adjustable time fuse.
Cash register 2.
Cash registers, etc., key stop for.
Cask pitching apparatus.
Caster.
Casting metals.
Casts, molding with molten wax for reproduction of.
Cement, etc., apparatus for manufacturing hollow bodies of.
Cheese making device.
Chenille fabric, apparatus for cutting.
Cigarette machine.
Cistern cleaner.
Clock, alarm.
Clock, electric.
Coal drill.
Coal hod.
Cock, ball.
Coin assorter and deliverer.
Coin controlled apparatus.
Combination lock.
Commutator traversing apparatus
Conduit sections, method of and apparatus for making.
Connecting rod.
Core spindle.
Corn shocker.
Corroding pot.
Corset fastener.
Cot or bed bottom, folding.
Cover lifter.
Cultivator 4.
Curbing, metallic.
Curtain pole.
Curtain ring.

Damper regulator.
Demagnetizer.
Deodorizing mineral oils.
Derailing switch.
Desk, school.
Die for manufacture of molded articles.
Dish cleaner.
Display case, sample.
Door check.
Door check and closer, pneumatic
Door, folding.
Door hanger 3.
Door, metallic.
Drawers supporter.
Dredging and conveying apparatus
Drills, spring break for hoe.

Electric machines, ventilating apparatus for dynamo.
Electrical conductors, cut off or safety attachment for.
Electrical indicator.
Electrode.
Electrolysis.
Elevator.
Elevator guard.
End gate and shoveling board 2.
Engine cab, traction.
Envelope.
Eye cup.

Fan, fly.
Fan, lawn.
Fan, ventilating.
Fanning mill.
Fare box and register.
Feed water heater.

Feed water heater and purifier 2.
Feed water heater attachment.
Feed water heaters, steam jacket attachment for.
Feed water purifier.
Fence post 2.
Fence stay, wire.
Fence, wire 2.
File, account.
Filtering device.
Fire escape.
Fire extinguisher, portable.
Fire place, gas burning.
Fishing rod joint.
Flouring rolls, etc., gage for 2.
Fly paper, sticky.
Foot ball.
Fountain.
Furnaces, apparatus for automatically controlling motive power for supplying air to.
Furnaces, coal dust feeder for.
Furnaces, valve for regenerative or other.

Galvanizing strips, apparatus for.
Garbage crematory.
Garbage furnace.
Garment fastening.
Garment protector.
Garment stretching frame
Gas burner regulator, independent
Gas engine 2.
Gas meter.
Gas meter, prepayment.
Gas or similar motor engine.
Gearing, sprocket.
Gears, machine for hobbing worm
Glass articles and apparatus therefor, cutting.
Glass, decorating.
Glassware, means for ornamenting
Gold saving apparatus.
Gold separator.
Governor, steam engine.
Grain cleaning and dust collecting apparatus.
Grate, vertically adjustable.
Grinding and polishing parabolic or analogous curvilinear surfaces, machine for.
Guns, cocking and ejecting mechanism for break down.

Hammer guide, steam.
Hammock.
Harrow 2.
Harrow and roller, combined.
Harvester, corn 2.
Hay carrier.
Hay fork.
Hay loader and rake, combined.
Heel gage for making heels.
Heel or sole plate.
Hinge, coach.
Hinged joint link for boxes or castings.
Hoisting apparatus.
Hook and eye.
Hop picker.
Horseshoe, combination.
Horseshoe toe calks, machine for making.
Hose and making same.
Hose bridge, adjustable truss.

Ice pick.
Impact tool.
Injector.
Insulating compound.
Iron heating furnace, sheet.

Journal and box.
Journal bearing.
Journal bearing, self adjusting.
Journal bearing, self oiling.

Kerosene burner.
Knit belts, forming.
Knob attachment.
Knockdown box.

Ladder, store.
Ladders, etc., trolley support and guide for step.
Lamp.
Lamp base, incandescent.
Lamp, incandescent.
Last block fastener.
Latch.
Latch, sliding door.
Lathing, metallic.
Leg, artificial.
Liquid mixing machine.
Locking device.
Locomotive bell ringer.
Locomotive traction, means for increasing.
Loom double lift Jacquard mechanism.
Loom fly shuttle attachment, carpet
Loom for making compound knit and woven hose, circular.
Loom pile wire.
Loom shuttle, carpet.
Loom shuttle tension device.
Lubricator.

Mail bag catcher.
Mail pouches or bags, locking mechanism for.
Maps, manufacturing relief geographical.
Measure, indicating tape.
Measure, tailor's 3.
Measuring apparatus, coal.
Measuring instrument, electrical.
Meat chopper.
Metal, apparatus for electrically heating 2.
Metal heating apparatus, electric 6
Metal heating.
Metal, method of and apparatus for electrically heating.
Metals by electricity, apparatus for brazing.
Milk tester.
Milking machine.
Milling and filling machine.
Mine trap door.
Moisture absorbing device.
Molding, building.
Motor.
Musical box case.

Nailing apparatus.
Nailing machine filling apparatus
Non arcing switch.
Nut, axle.
Nut locking bolt.

Oil and gas separator.
Oil cup.
Oiler.
Oiler tip for bottles or cans.

Paper folding machine.
Paper tubes, making.
Paper vessels, machine for the manufacture of.
Paste, etc., on strips of paper, machine for spreading.
Patrol box, safety.
Pestle.
Phrenomoter.
Piano action.
Pipe hanger.
Pipe wrench.
Planter.
Planter, tobacco.
Plaster slab and making same, rock face.
Plates, apparatus for cleaning baking.
Plow 2.
Plow subsoiler attachment.
Plume or feather and sewing same
Precious metals from their ores, apparatus for recovering.
Preserving fruits.
Printing multicolor designs on textile fabrics.
Printing press fliers, attachment for
Pruning implement.
Pulley, loose.
Pulleys, die for beading metal.
Pulping or disintegrating machine
Putting out machine.
Puzzle, block.
Pyrometer.

Radiator 2.
Rail joint.
Railway, closed conduit electric 2.
Railway, conduit electric 2
Railway, electric.
Railway rail joint box.
Railway signal.
Railway signal apparatus, electric
Railway street and station indicator
Railway supply system, electric 5.
Railway switch, automatic.
Railway tie plate, adjustable.
Razor concaving machine.
Refrigerator car.
Refrigerator car ventilator.
Refrigerator cut off.
Rein, safety.
Rein support.
Rheostat.
Riveting machine.
Road engine.
Roasting furnace, ore.
Rolling mill.

Saddle, harness.
Sand blast apparatus.
Sash fastener, automatic.
Sash holder.
Sash, window.
Saws, machine for setting diamonds in.
Scoop, sifter and measure, combined flour.
Screw driver, pocket.
Seam marker.
Sectional boiler.
Separator.
Sewing machine, broom.
Sewing machine fan attachment.
Sharpener, scissors.
Sheep shears, machine.
Sheet metal can.
Shelf roller.
Shoes, making.
Shutter bower and fastener 2.
Sign, revolving.
Signaling apparatus, police.
Skinning animals.
Skirts and bodices of dresses, attachment for connecting.
Smelting ore, art of and apparatus for electrically.
Snap hook.
Soap cutting machine.
Spark arrester 2.
Spindle bearing adjusting device.
Spittoon.
Spoke grinding and polishing machine.
Spray.
Spring clip.
Stamp affixing machine 2.
Station indicator.
Steam and hot water heater.
Steam boiler.
Steam generator 3.
Steering apparatus, steam and hand
Steering gear, electrical.
Stereotyping machine.
Stirrup, safety.
Stool seat, piano.
Stove front.
Stove, gas.
Stove, oil.
Stove or furnace.
Strap finishing machine.
Straw stacker.

Street gate box.
Street sprinkler.
Street sweeper.
Submergible boat.
Surfaces upon articles having irregular contours, apparatus for forming.
Surgical pump.
Switch thrower.

Tank.
Telephony.
Thill coupling 2.
Tide power
Tire, pneumatic.
Tire, velocipede.
Tires, cement injector for repairing pneumatic.
Tires, manufacturing pneumatic.
Tobacco brushing and cleaning machine, leaf.
Tobacco pipe.
Toilet powder bag.
Torpedo setter.
Trolley.
Trunk or box, lunch.
Truss.
Tube ends, machine for closing.
Tube testing machine, hydraulic.
Tufting
Type writing machine.

Valve.
Valve, ball cock.
Valve for steam boilers, safety check
Valves and their connections, construction of.
Vehicle brake.
Vehicle wheel.
Vending machine, automatic.
Vending machine, coin controlled
Veneers, uniting.

Wagon loading machine.
Washing machine.
Watch alarm.
Watchmaker's staking pliers.
Water closet.
Water closet coupling.

Water for use as motive power, means for elevating and storing sea.
Water meter, disk.
Weeder, hand.
Welding apparatus, electrical.
Welding pipes, method of and apparatus for butt.
Well drilling apparatus.
Wheel and rail brake.
Wind board adjuster.
Windmill.
Window screen.
Wood, vulcanizing.
Wool, extracting grease from.
Wrench
Wrench handle.

APRIL 16, 1895.

Abraiding and polishing annular articles, machine for.
Abraiding and polishing circular articles, machine for.
Acid, Phenylamidonaphtholsulfo.
Advertising, automatic device for.
Agricultural digger.
Air-brake.
Alloys of iron or steel with nickel.
Auger, earth.
Antomatic sprinkler.
Awning 2.
Axle-box.

Bandage-winding machine.
Bank, cash-registering savings 2.
Barrel.
Bath-tub.
Batteries, &c., glass vessel for secondary.
Bearing for windmills. Ball.
Bed-bottoms to bedsteads. Device for attaching.
Bed, folding.
Bed, seat, &c., spring.
Bed, sofa.
Bedstead-clamp.
Berth raising and lowering mechanism.
Bicycle.
Bicycle-brake.
Bicycle handle-bars, machine for bending.
Bicycle speed-changing gear.
Bicycle-stand.
Billet-loop.
Blower, centrifugal.
Boiler 2.
Boilers, manhole-closure for steam.
Book, scrap.
Bottles, device for preventing the refilling of.
Box or trunk tray.
Bucket, fire.
Burnishing-machine.
Butter-packer.
Button-fastener package.

Cabinet for liquids on draft, combination.
Calculating and measuring inrtrument, trigonometrical.
Candy-cougealer.
Car bolster.
Car-brake.
Car-brake adjnster.
Car brake handle, street.
Car-coupling 4
Car-drop-fender, street.
Car-fender 3.
Car safety-guard.
Car, stock.
Car-strap.
Card punch-selecting machine, jacquard.
Card, shipping or defect.
Carriage bracket and step.
Cart or wagon, chute.
Cash receiving, delivering, and recording device.
Cash register.
Casket lowering apparatus.
Casting car wheels, ladle for.
Check, watch.
Chlorin, making
Churn and butter-worker.
Churns, &c., apparatus for operating.
Cigar-stamping machine.
Clothes drier.
Clothes line.
Clothes wringer.
Clutch and stop.
Coal, removing piles of.
Commutator.
Condensing apparatus.
Cooker and evaporator, steam feed.
Cooling and refrigerating apparatus
Corset.
Cotton chopper.
Cotton gin, roller.
Crema ory.
Crimping and beading machine.
Cultivator.
Cushion making machine.
Cut out and lightening arrester, combined.

Dam.
Dental plates, &c., device for swaging.
Designing engine.
Desk.
Display apparatus.
Display stand.
Distillation of alcohol, &c., process of and apparatus for fractional.
Doll.
Door opener or closer.
Door or window protector.
Draft equalizer.
Drilling machine.
Dye orange.

Ear protector.
Egg cell case.
Electric distribution system.
Electric machine regulator, dynamo
Electric meter.
Electric switch 5.
Electrical conductors, safety support for overhead
Electrical interrupter.
Elevator safety appliance.
Elevator safety device.
Elevators, automatic stop attachment for hydraulic.
Engine.
Engine cylinders, mechanism for steam.
Engines, device for increasing stroke of steam or other.
Envelope.
Envelope making machine.
Exhaust head, steam.

Fan.
Fan oil guard, electric.
Faucet.
Feed water apparatus.
Fence post.
Fence tightener, wire.
Filter 2.
Floor construction.
Floor spacing strip.
Flue thimble cover, safety.
Fly switch.

Game apparatus.
Garment stretcher.
Garment supporter.
Gas and water or gas and oil, means for separating.
Gas burners, shade or globe and holder for incandescent.
Gas engine.
Gas meter, coin controlling prepayment.
Gem cluster setting.
Gold from moving water, apparatus for collecting.
Grain separator timothy cleaning attachment.
Guns, breech attachment for rapid fire.
Guns, recoil locking bar for bolt.

Hair fastener.
Harvesters, combined compressor and trip mechanism for.
Hay cleaning machine, baled.
Hay rack.
Hay, straw, &c., preparing baled.
Heels with nails, machine for loading.
Hinge, gate.
Hinge, sanitary closet seat.
Hoist, tilting.
Hoisting and conveying apparatus.
Holdback and thill holder.
Horse boot.
Horseshoe.
Hose coupling.
Hose or pipe coupling.
Hose reel.
Hot air engine.
Hub, vehicle.
Hydrocarbon furnace.

Ice shoe nail for horses, &c.
Insulator, electric wire.
Iron, steel, &c., apparatus for preparing strips of.

Joist hanger, wrought metal. 2

Knitting machine, circular.
Knitting machine looping attachment 2.

Lace fastener.
Lacing hook, shoe.
Ladder, fire.
Lamp, electric arc 3.
Lamp, incandescent electric.
Lamps, evacuating incandescent.
Lamps, filament and carbon for electric.
Lamps, machine for securing filament holders in globes of incandescent.
Last attachment, split.
Latch.
Lathe center rest.
Leaf turner.
Letter sheet.
Life preserver.
Lifter.
Lock 2.
Loom warp stop motion.
Lumber, machine for manufacture of.

Manometer, capillary.
Measuring, bagging, and registering machine, grain.
Measuring instrument, electric 3.
Mechanical movement.
Mold for formation of ticket racks.
Mosaics, &c., process of and apparatus for manufacturing.
Mower, lawn.
Music leaf turner, automatic.

Nut cracking machine.
Nut lock 2.

Oar, bow facing.
Oil for fuel, apparatus for handling.
Oil, process of and apparatus for extracting.
Ordinance breech mechanism.
Ore concentrating apparatus.
Organ, pipe.
Pail, packing and shipping.
Pan or pot, stew or other.
Paper case, toilet.
Paper, machine for supplying silk fiber to.
Paper tubes, machine for making.
Paper vessels, machine for making.
Pen, stencil making.
Photograph embrossing machine.
Photographic camera.
Piano action.
Picture frame holder.
Pipe, apparatus for manufacturing 3
Pipe drawing apparatus 9.
Pitman box.
Planter, corn.
Planter, cotton.
Planter, potato.
Planter, tobacco.
Plow, sulky.
Plumb and level, combined.
Plumber's blast furnace.
Pneumatic tool.
Polishing and cleaning wheel.
Powder sprinkler.
Pressing board.
Printer's proof press.
Printing machine.
Printing machine bed motion.
Printing machines, means for securing plates to cylinders of rotary.
Propeller, vessel.
Propulsion, manual boat.
Pulverizing apparatus.
Pump, sirup.

Railway block signal lock and register.
Railway brake.
Railway conduit system, electric 3.
Railway gate.
Railway rail bending machine.
Railway rail joint.
Railway switch.
Railway train bumper.
Railways, &c., safety clutch for inclined.
Railways, sectional conductor for electric.
Ratchet for screw drivers or drills.
Refrigerating apparatus, automatic valve actuating device for.
Refrigerating machine.
Refrigeration, process of and apparatus for.
Refrigerator basket.
Refrigerator door.
Resawing machine.
Respirator, mask.
Rim or hub bands, machine for making.
Roaster.
Rolling mill for manufacture or shaping of chains.
Rolling mills, roll for chain.
Roof, metallic.
Rope driving device.
Rope winding apparatus.

Sad iron.
Saddle, gig.
Sash holder.
Saw guide, adjustable antifriction band.
Saw, hand.
Sawmill carriage.
Sawing machine, circular.
Scaffold, extensible.
Scene, transformation.
Scoop, weighing.
Seaming pipe elbows, machine for.
Secondary battery, 2.
Sewing machine fan attachment.
Sewing machine for lasting boot or shoe uppers.
Shirt waist.
Shoe.
Shoe, burial.
Signaling apparatus.
Sleeve expander.
Sleigh runner for wheeled vehicles
Smoke consuming furnace.
Smoke washing apparatus.
Snow plow.
Sole leveling machine.
Spi ot.
Spinning and twisting machine spindle
Spool or mandrel.
Spring motor 2.
Springs, machine for making wire
Square, sliding T.
Steam boiler.
Steel plate, composite.
Stove, gas.
Straw stacker 2.

Teaching diaphragmatic breathing, apparatus for.
Teeth holder, sample.
Telegraph, printing.
Telegraphy.
Telephone exchange system, automatic.
Tile joint for suspended channel bar tracks
Tile and securing same, roofing.
Tile cut off, automatic.
Tire.
Tire, pneumatic 2.
Tire, supplemental.
Tire valve, pneumatic.
Tobacco receptacle, cutter and register, plug.
Tongs, pipe.
Toy baby carriage.
Toy bank.
Toy piano.
Train stop.
Transfer table 2.
Tray.
Truck, barrel.
Trunk, convertible.
Type distributer for line casting machines.
Type writing machine 2.

Umbrella ribs, machine for heading
Umbrella runner.
Upsetting rods, bolts, etc., machine for.

Valve.
Valve, expansion steam.
Valve lock.
Valve, plug.
Vaporizing high grade or fire test oils for heating purposes, apparatus for.
Vegetable or like materials, apparatus for treating.
Vehicle brake, automatic.
Vehicle, electrically actuated.
Velocipede, railway.
Veneer cutting machines, pressure plate for.
Ventilator.
Vessel, sailing.
Veterinary medicine spoon.
Vise 2.

Wagon.
Wagon box lifter.
Washing machine 2.
Wave motor.
Weigher, automatic grain.
Wheel, pneumatic tired.
Whistle.
Windmill 2.
Wire devices, machine for making looped.
Wire flattening machine.
Wire straightening machine.
Wood indenting machine

SPECIAL OFFER TO PHOTOGRAPHERS.

THE INVENTIVE AGE makes a feature of illustrating new inventions and new triumphs in engineering and mechanics.

Under this heading may be classed the building of canals and waterways, modern vessels and war ships, modern buildings, interior views of model machine shops and factories, railroad bridges, views of engineering achievements of every nature, natural wonders and discoveries, new machines, engines, motors and developments in electrical science, novelties, labor saving devices, etc.

We desire the assistance and co-operation of amateur and professional photographers everywhere. Every photographer has in his collection, or can obtain, one or more views that can be used in the AGE. We also want photos of prominent inventors as well as their inventions.

Not only will we give the artist credit for any view used but in addition we will forward the AGE free one year to his address. In instances of special merit and views of extraordinary achievements of genius and labor, cash prizes will be awarded.

Readers of THE INVENTIVE AGE in all parts of the world will confer a favor by advising local photographers of our request.

It is also desired that accompanying each view, there also be sent a complete description of the subject or enterprise, or that the address of some person be given from whom complete information can be obtained.

Industrial Items.

Thos. Dolan & Co., woolen manufacturers, Philadelphia, Pa., have granted an advance of 15 per cent in wages to their weavers.

The Indiana Car and Foundry Company, Indianapolis, Ind., have resumed operations and are running to their full capacity.

It is said that an attempt to raise the scale of wages will be made by the Amalgamated Association of Iron and Steel Workers, at their convention in Cleveland next month.

Linn & McCoy's iron works, Bellefonte, Pa., which include wire and rolling mills, and chain works, have resumed operations after a long shut down, giving employment to about 200 men.

The American Starch Works at Columbus, Ind., operated by the Mooneys, well known in industrial circles, were destroyed by fire on the 6th ult. The loss is $200,000; amount of insurance, $85,000.

The Globe Ship Building Company, of Cleveland, on the 3d ult., announced an increase of 10 per cent in the wages of their employes to take effect on the 8th ult. This is virtually a restoration of the wages paid prior to January 1st, 1894.

Another "Shark" Falls

Paul James Gregory, of Marilla and Buffalo, N. Y., in the Toils.

Arrested by United States Authorities for Fraudulent Use of the Mails.

The "Inventive Age" is After the Rascals and One by One They Fall.

Inventors and readers of THE INVENTIVE AGE all over the world will be interested in the information that on April 22d Paul James Gregory, one of the rankest frauds pretending to be engaged in the patent selling business, was arrested in Buffalo, N. Y. by Deputy U. S. Marshal Kane, indicted for fraudulent use of the mails in an alleged fake patent attorney and agency scheme.

THE INVENTIVE AGE has received the following letter from the postmaster at Buffalo:

BUFFALO POST OFFICE,
OFFICE OF THE POSTMASTER,
BUFFALO, N. Y., APRIL 25, 1895.

M. H. Jewell, Esq.,
The Inventive Age, Washington, D. C.

DEAR SIR:—Replying to your letter of the 24th inst. I beg to inform you that all matter addressed to Paul James Gregory, Buffalo, N. Y. is being marked "fraudulent," and all such matter bearing a return request is returned to the writer; if it bears no return card it is sent to the Dead Letter Office.

Respectfully, Yours,
HOWARD H. BAKER,
Postmaster.

THE INVENTIVE AGE and United States authorities are after other sharks in the same business and if an inventor gets caught by them it will simply be because he is not a reader of THE INVENTIVE AGE. The only magazine waging war on Patent Sharks. No inventor should miss a copy beginning with the May issue.

Here is what a reader of INVENTIVE AGE writes under date of April 16th, in relation to the fraud:

CHICAGO, April 16th 1895.
Inventive Age Publishing Co., Washington, D. C.

GENTLEMEN: Enclosed please find letter written to me by Paul James Gregory "Patent Attorney and Broker" of Marilla, N. Y. I also enclose copy of the letter which I wrote him. The enclosures are all at your disposal. Hoping you will keep the good work agoing and run them out of the business, I remain

Yours for success.
JOHN A. ARMBRUSTER,

(Copy of Armbruster's Letter to Gregory.)

CHICAGO, April 16th 1895.

Paul James Gregory, Esq.,
Patent Attorney and Broker,
Marilla, N. Y

DEAR SIR: Yours of the 18th inst. received and contents fully noted. Your letter is very interesting and amusing. I suppose the price you mention in your letter, namely about $70,000, is what you think you can sell the patent for. This is the interesting part of the letter. This being a transaction of such great magnitude, I desire to appoint an attorney to represent me in the transaction, which I am pleased to say is "The Inventive Age," of Washington, D. C. It is probably not necessary to give you their street number as you have undoubtedly heard of them before, as they, I understand, have given you more or less free advertising in the past and intend to give you more in the future—but probably not of the kind that you desire. Our advice to you is to let me pass and try somebody who is not a subscriber of "The Inventive Age" who would therefore not be well posted on the gentlemen (?) in your line of business. I remain

Very respectfully yours,
JOHN ARMBRUSTER,
66 N. Canal St., Chicago, Ill.

Endorse the "Inventive Age."

SAVED THOUSANDS OF INVENTORS.

LEXINGTON, Ky., April 15—It would be impossible to too strongly express my endorsement of your course in ferreting out, and denouncing in your valuable Journal, the many infamous frauds being foisted upon unsuspecting inventors, who are too prone to believe the plausable circulars these "fake" agencies so artfully contrive. I confidently believe you are instrumental in saving thousands of inventors from the clutches of these people as you undoubtedly have me. You certainly are making your influence felt, because I have received a number of circulars in which the "Age" is denounced.

With many good wishes for your continued success in your splendid work, I am

Yours truly,
N. P. TAYLOR.

BOUGHT HIS EXPERIENCE.

LANARK, ILL., Jan 5.—I like your paper very much indeed. I have been much rejoiced at your exposure of "Patent Sharks." I have been nipped by them to the extent of $40 or $50 in all, by different ones. I knew something of what to expect before I began dealing with them. When my patent was issued got about a half a bushel of circulars, etc. I picked out two of the most reliable looking ones and dealt with them, but I lost all the money I sent them.

A. GUILD,

NEW PATENTS FOR SALE.

Advertisements inserted in this column for 20 cents a line (about 7 words) each insertion. Every new subscriber sending $1.00 to THE INVENTIVE AGE will be entitled to the AGE one year and to five lines three times FREE. Additional lines or insertions at regular rates.

WANTED.—To hear from parties with capital, interested in developing a valuable invention of merit. For further particulars address George C. Stanton, New Iberia, La. 5tf

FOR SALE.—Patent No. 535,337; Rotary Engine; issued March 5, 1895. Simple in construction and mode of working. Inexpensive to manufacture. Correspondence solicited. Address, Joseph West, Galveston, Texas. 5-7

FOR SALE.—U. S. patent, No. 515,792, and Canadian patent, No. 45,700. Adjustable Door Fender. A simple, practical and inexpensive article to manufacture. Will sell entire or state rights or royalty. Ira A. Ritz, Nobscot, Mass. 4-1

FOR SALE.—Patent No. 493,115; Time Lock. Will sell state rights or United States at reasonable prices. Lock can be applied to any common safe door. Locks for five minutes or for seven days. For any information address N. B. Reis, Lincoln, Kans. 4-7

FOR SALE.—Something good—Mowing Machine Knife Bar. This bar is so arranged as to hold the knives and Pitman eye with one bolt. For particulars address Z. E. Wiseman, Vadis, Lewis Co., W. Va. 4-7

FOR SALE. A valuable patent on corn planting machinery, No. 527,160. Fits nearly all planters. Splendid to work by agents. Will sell or place on royalty with bonus. Address quickly, Leroy Runyan, Iola, Kans. 4-7

FOR SALE.—A valuable patent, No. 506,545. A Combined Sewing Stand and Ironing Board, a very useful piece of furniture. A chance for agents and manufacturers to make good interest on their money. Address, Mrs. Martha Reck, Union Bridge, Md. 3-5

FOR SALE.—I will sell outright, or on royalty, my valuable patent, No. 521,568, Burial Case or Vault for Graves. Manufactured from fire clay or other suitable material. Address, Jas. F. Hobson, New Antioch, Ohio. 3-5

FOR SALE.—I will sell outright, or on royalty, my valuable patent Pipe Wrench in Canada and England. It is superior to any in use and can be cheaply constructed. Address, James A. Smith, Cleavesville, Mo. 3-5

FOR SALE.—My patent, No. 513,542, and also an additional patent allowed but not issued, "An improvement in Tinners Hand Shears or Snips." Will sell on reasonable terms. Address, Geo. H. Stockman, 3510 N. 17th street, Philadelphia, Pa. 3-6

FOR SALE.—Patent No. 535,337; Rotary Engine; issued March 5, 1895. Simple in construction and mode of working. Inexpensive to manufacture. Correspondence solicited. Address, Joseph West, Galveston, Texas.

FOR SALE.—Or on royalty patent No. 532,151, Door Prop or Bolt. Holds the door open at any point and will bolt it when shut. Also best bosom board made. L. Funk, Waynesburg, Pa. 4-3

FOR SALE.—Or trade, patent No. 477,246, Washing Machine. Has stood practical use. Am not able to give it attention on account of poor health. A bonanza for right party. T. D. C., Box 43, Boyleston, Ind. 4-7

FOR SALE.—One-half interest of territorial rights of patent No. 432,592. A device for dressing or cutting mill stones. Address, Simon P. Bacaston, Sand Beach, Pa. 4-7

FOR SALE.—Patent No. 454,254, on toy belonging to the "puzzle" family. A fine opportunity for some person or novelty manufacturer. Only $200 and royalty if taken at once. Max Cohn, 828 Vliet St., Milwaukee, Wis.

FOR SALE.—Patent No. 524,279; Rocking Chair. Enables occupant, through easy push on the rocking foot or arm rest, to swing and rock combined; adjustable parts. State and county rights for sale. Address, John Koltmann, Jeannette, Pa. 2-5

FOR SALE.—Outright, or State right, my two U. S. patents, Nos. 445,929 and 503,564, for "Shaft Tugs." If I can sell or lease whole business, will let the tooles for making the goods go with patent. Address, E. L. Carlton, Selma, Clark Co., Ohio. 3-5

FOR SALE.—A valuable invention; Patent Seed and Grain Cleaner. Will sell the territory of several of the eastern states. Address, Jos. W. Henry, 504 American Bank Bldg., Kansas City, Mo. 3-5

FOR SALE.—Patent No. 525,225; Gravity Door Lock. Has no springs, Easy working, cheapest and most durable. Address, B. S. Miles, Gray Summit, Mo. 2-7

FOR SALE.—A Patent Furniture Castor to prevent insects of all kinds from infesting furniture. It is one of the best things on the market. Does not infringe another patent. Address, Jonathan Elwood, Sanger, Cal. 3-5

FOR SALE.—Patent No. 436,183, Glass Plant Protector; frost proof; produces melon and all other vegetables twenty days earlier than in the open air. Will sell out right or on royalty. Testimonials on application. Address, John Holder, Morley, Scott Co., Mo. 3-5

BUSINESS SPECIALS.

Advertisements under this heading 20 cents a line each insertion—seven words to the line. Parties desiring to purchase valuable patents or wanting to manufacture patented articles will find this a valuable advertising medium.

WANTED.—To manufacture on royalty, household inventions. Send specifications and if models are sent prepay all charges. Galpin & Hanley, Binghamton, N. Y.

WANTED.—To manufacture on royalty or purchase half interest in valuable patent that is in immediate demand. J. H. Snow & Co., Indianapolis, Ind. 3-5

WANTED.—Having invented several successful machines, I offer my services to anyone wishing to have an improvement made on any kind of machinery for a reasonable compensation, and if I fail I ask nothing. Address, Wm. E. Pleasants, La Junta, Col. 4-6

WANTED.—Some manufactures to make and sell my one process cider mill on royalty. Address, Wm. E. Pleasants, La Junta, Col. 4-6

WANTED.—Inventions of merit and in big demand to manufacture on royalty. Send model, specification, and state what you want on your invention. G. W. McCook, 720 Olive Street, St. Louis, Mo. 4-

WANTED.—Some articles to manufacture that will pay thirty per cent on the investment and will not require over five thousand dollars to put on the market. Address, S. Z. Starr, Drawer U, Indianapolis, Ind. 4-7

WANTED.—An agency to purchase or promote the interests of a good and meritorious invention. Address, with descriptive particulars, H. S. Hampton, Box 223, Lima, O. 3-5

WANTED.—An experienced salesman to sell my new patent. A preventative against train or bank robbery. For particulars, address, Silas E. White, Watertown, N. Y. 2-5

WANTED.—Manufacturers or capitalist who wish to pay all expenses for an interest in the patent for a meritorious invention to be patented. Address, George C. Stanton, New Iberia, La. Correspondence solicited. 3tf

Electric Flashes.

Chas. M. Jarvis, president of the Berlin Iron Bridge Company has been appointed receiver of the Mather Electric Company, of Manchester, Conn.

In a recent interview, Dr. Bell the famous inventor, expresses the belief that an instrument can and will be invented for the transmission of sight by electricity.

George W. Phelps, who died suddenly in New York on the 10th inst., was one of the pioneer journalists in the electrical field, being for many years identified with the Electrical Engineer of New York.

Justice Williams, of the Supreme Court of Pennsylvania, has handed down an important decision in which he sets aside the claim of eminent domain on country roads, made by trolley companies in that State.

An electric elevated freight railway between Chicago and New York is now one of the possibilities, a company with $200,000,000 capital having been organized and the books opened for subscription to the capital stock.

The provisions of the agreement between the General Electric Company and the Westinghouse people are said to be an agreement for pooling the patents of the two companies, each company to have the right to use the other's patents.

Even sleepy old Cairo in Egypt is to have a trolley system of street cars. Tourists who desire to see only ruins, surrounded by superstition and lethargy will soon be unable to have their tastes gratified. Electricity is modernizing and civilizing the whole world.

The economy of separate electric motors is shown by the fact that the Baldwin Locomotive Works save about 40 per cent in fuel by the removal of the overhead shafting from that portion of its shops devoted to wheel work and the installation of an electric motor for each machine.

The Cosmopolitan Electric Co., of Chicago, has had its extraordinarily broad franchise held of doubtful value by Judge Payne. His decision on a motion for an injunction is that the ordinance passed by the common council granting the franchise was illegally passed and therefore invalid and inoperative.

Few people understand the great superiority of the telephone system of the United States and the cheap prices of telephone service, as compared with that in Europe. In Germany and France they have never had any fundamental telephone patents, and all telephone subscribers in France have to buy and maintain their own instruments.

Attorneys Disbarred.

The following attorneys have been disbarred from practicing before the U. S. Patent Office or any bureau of the Interior Department:

John T. Mass, Chillicothe, Mo.; James Rutter, Clarington, Ohio; Geo. W. VanLeuven, Jr. Lime Springs, Io.; M. V. Blake, Morganton, N. C.; Geo. Demarest, Seneca Falls, N. Y.; L. W. Mead, Sherman, Texas; Jeremiah Haralson, Pine Bluff, Ark., E. H. Farrar, Rochester, N. Y.; Thos, J. Colton, New Richmond, W. Va.

Aftermath.

The Baltimore Centennial Association, has commenced active work for their great exposition in 1897.

THE North Dakota Milling Association, is one of the latest monopolies to go into the hands of a receiver.

BY the starting up of the Fall River mills over 20,000 workers are benefited. The old scale of wages has also been restored.

A RECEIVERSHIP for the Lake street electric road in Chicago has been asked for by Wm. Ziegler, a large New York stockholder.

THE Railway Age is authority for the statement that 373 railway companies are preparing to build 20,547 miles of new line. As this equals the aggregate of the new trackage for the last four years, it looks as if there is to be a boom in railroad building.

MR. E. D. EASTON, who has been elected president of the American Graphophone Company, which controls the graphophone business for the whole world, has been president of the Columbia Phonograph Company of Washington ever since it was organized, and was one of the first to recognize the business possibilities of the talking machine.

UNDER the patronage of the senate of Lubeck, a German and North European exhibition of commerce and industry is to be held in that town from the 1st of July to the 30th of September, 1895. To assure financial success, a guaranty fund of 400,000 marks has been subscribed by the government of Lubeck, the merchants, and private persons.

THERE is a fair probability that several of the new gunboats which Spain proposes building may be constructed in this country. There is no reason to doubt that an American firm may secure a part of the contract if its bid be as low and its guarantees of efficiency as satisfactory as those of its competitors. Spain has but two private ship-building yards. One at Bilbae and another near Cadiz. Neither has an extensive plant.

THE Newport News (Va.) Shipbuilding and Dry-Dock Co. has launched a steamer for the Norfolk & Washington Steamboat Co. which will be named Newport News. She is 274 feet long, with a width of forty-six feet. She is contracted to have a a speed of twenty miles an hour, but it is possible that this will be exceeded. Her steel hull is divided into eight water-tight bulkheads, and will contain two double-cylinder boilers thirty-two feet in diameter.

Money for Everyone!

I can't understand why people complain of hard times, when any woman or man can make from $5 to $10 a day easily. All have heard of the wonderful success of the Climax Dish Washer; yet we are apt to think we can't make money selling it; but any one can make money, because every family wants one. I made $478.36 in the last three months, after paying all expenses and attended to my regular business besides. You don't have to canvass; as soon as people know you have it for sale they send for a Dish Washer. Address the Climax Mfg. Co., Columbus Ohio, for particulars. Go to work at once, and you will very soon have a full pocket book and a light heart. I think it a duty to inform each other of such opportunities, and I also think it a duty to improve them while we may. Try it at once, and publish your experience so others may be benefited.

Patent Office Explosion.

On the 22d ult. there was an explosion of ether in the photograph rooms of the Patent Office, resulting in the severe burning of two or three of the employees and the destruction of something like $1,000 worth of property. In this room were stored a large number of copies of patents and specifications and although the fire department extinguished the flames speedily many packages were charred by the heat and ruined by water.

Relentless War.

THE INVENTIVE AGE has been waging relentless war upon patent sharks, and has published some very valuable information as to who and what they are. But like the poor—they will always be with us; and their methods will suffer little change. Like other confidence men, they do not expect to find their customers among "those who read the papers." They fish upon the principle that there are still in the sea fish as good as ever were caught.

If our friend Capehart could mail his paper to the patentees of every week, as the shark does his lure, good would be accomplished; but that is not possible, and so the game will go merrily on.

He says the sharks are beginning to bite back, but he is mistaken. The bite did not come from a shark. It was probably from a dog-fish, who thinks he may some day evolute into a shark. The real shark does not show his belly for nothing.—*Power and Transmission.*

THE INVENTIVE AGE can recommend the "Climax" watch, advertised in another column, as being, undoubtedly, the best stem-winder watch for the price in the market. It is a good time keeper, and either a plain or imitation engraved cases can be had. This watch is fully timed and regulated and fully guaranteed for one year, the same as Waltham or Elgin.

INVENTIVE AGE BUILDING.

PREMIUMS TO SUBSCRIBERS.

Read the following offers to new subscribers:

OUR $1 OFFER.

THE INVENTIVE AGE one year and two copies of any patent desired, or one copy of any two patents..... $1 00

THE INVENTIVE AGE one year and a list of 50 firms who manufacture and sell patented articles..... 1 00

THE INVENTIVE AGE one year and Altograph map of the City of Washington 1 00

THE INVENTIVE AGE one year and a five line (35 words), advertisement in our "Patents For Sale," or "Want" column, three times..... 1 00

For $1.

THE INVENTIVE AGE and any one of the following Scientific books:

How to Make Electric Batteries at Home, fully illustrated, by Edward Trevert.

Everybody's Handbook of Electricity, illustrated, by Trevert.

How to Make a Dynamo, by Trevert.

Practical Directions for Electric Bell Fitting and Electric Gas Lighting, by Trevert.

Elihu Thompson's What is Electricity?

OUR $1.35 OFFER.

THE INVENTIVE AGE one year and Joseph Allen Minturn's famous book "The Inventor's Friend," indorsed by such high authorities, as Dr. Gatling, Clem Studebaker and others,.....$1.35
Book alone 50 cents.

THE INVENTIVE AGE one year and any one of the popular and instructive books as per offer in another column, under heading of "Popular Scientific Books,".....$1.35

THE INVENTIVE AGE one year and any one of the "Excelsior Edition of Standard Poets," mentioned elsewhere in this magazine.....$1.35

THE INVENTIVE AGE one year and a copy of "Picturesque Washington," 260 pp., 136 illustrations, Stilson Hutchins' famous book, former price $2, sent to any address in the United States..... $1 35

THE INVENTIVE AGE one year and The Peoples' Atlas of the World, one of greatest bargains ever heard of; size of Atlas 14 x 22 open; latest maps and statistics; handsomely illustrated, a $2 book with AGE one year—both for.... $1 35

☞ See another column for other offers.

OUR $1.50 OFFER.

THE INVENTIVE AGE one year and Robt. Grimshaw's famous book "Tips to Inventors"..... $1 50

Address all communications to
THE INVENTIVE AGE,
Washington, D. C.

Want a Fountain Pen?

One of the very best in the market, a standard article, warranted, will be sent as a premium with THE INVENTIVE AGE. The retail price of the pen is $2.75. We will send the AGE one year and the pen for $2.75.

"Tips to Inventors."

This is one of the most instructive and useful works for mechanics and inventors. Its author is Robert Grimshaw, M. E., and the book, cloth bound, retails for $1. THE INVENTIVE AGE for one year and "Tips to Inventors" will be sent to any address for $1.50

"BUBIER'S POPULAR ELECTRICIAN" is the name of a monthly publication which contains a vast amount of valuable information on all electrical subjects. Its department of "Questions and Answers" will be appreciated by students and amateurs desiring information or instruction on any problem that may arise. THE INVENTIVE AGE has made special arrangement whereby we can supply that popular dollar journal and THE INVENTIVE AGE—both publications one year—for $1.50.

THE Crown Fountain Pen, a standard article received the highest awards at the World's Fair. It is always ready, clean, simple and economical. Can carry in vest pocket like a lead pencil. Best hard rubber holder, gold top feed and 14k gold pen. Retail price $2.75. We will send the THE INVENTIVE AGE one year free, in lieu of other premiums to each purchaser of one of these pens.

Mechanical Drawing

TAUGHT BY MAIL THOROUGH PRACTICAL

Mechanics; Architecture; Architectural Drawing; Electricity; Steam Engineering (Stationary, Marine, Locomotive); Iron Work; Railroad, Bridge and Municipal Engineering; Plumbing; Heating; Mining; Prospecting; English Branches. Courses begin with Arithmetic. DIPLOMAS AWARDED. The Largest Technical School in the World. Send for Free Circular, stating subject you wish to study.

The International Correspondencn Schools, Scranton, Pa.

TYPE, Printing Presses,

- Paper Cutters and
- General Printers'
- Machinery
- And Materials.

John Ryan Foundry,

Type Founders.

Frederick and Water Streets, BALTIMORE.

ELECTROTYPING in all its Branches.

$1.98 ═══ $2.48

Any ladies' shoe in the house

One Dollar and Ninety-eight cts.

The pick of men's shoes for

Two Dollars and Forty-eight cts.

Stoll's Shoe Palace,

810 7th St., N. W.

McLaughlin & Fitzsimmons,

Popular Price Tailors,

1003 Pa. Ave., N. W.

OUR MOTTOES:

Superior Quality,
High Class Workmanship.
Perfect Fits.

WM. DUFFY,

REGISTERED

Plumber and Gas Fitter,

1130 N. CAPITOL ST.,

WASHINGTON, D. C.

ESTIMATES FURNISHED

Orders by mail will receive prompt attention.

EXPERT MODEL MAKING

Established 1867.

J. C. SEYL, Prop'r, Chicago Model Works,
179-181 E. Madison St., Chicago, Ill.
Write for catalogue.

THE

Railroad Car Journal

IS THE ONLY

publication in the world devoted exclusively to the construction, maintenance and interchange of Railroad Car Equipment. A Journal for Superintendent of Car Department, Foreman, Inspector and Repairer; and especially for inventors of car appliances. Subscription ONE DOLLAR per year. Sample Copy Gratis.

617 Vanderbilt Building, NEW YORK.

T. H. ALEXANDER. *38 Years Practical Experience.* ESTABLISHED 1857. ARTHUR E. DOWELL, *12 Years Practical Experience.*

ALEXANDER & DOWELL,

SOLICITORS AND COUNSELLORS **Patent Causes.** Attorneys at Law and Mechanical Experts.

Patents and Trade Marks Procured in all Countries.

Offices: Marble Building, Opp. U. S. Patent Office, 607 7th St., N. W., Washington, D. C.

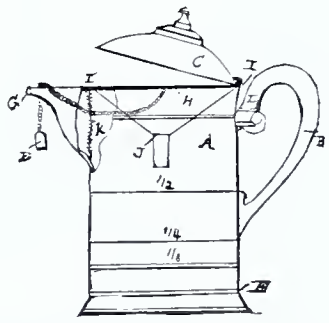
AUSTRALIA.

Fortunes are still often realized by Patenting American Inventions in that rich series of countries forming the Australian Colonies, viz., Victoria, New South Wales, South Australia, Western Australia, Queensland, New Zealand and Tasmania.

George G. Turri, Registered Patent Agent, of Melbourne who is known throughout the world as a Leader in his Profession, and has during the last 9 years obtained an unusually large number of Patents for American inventors and Patent Attorneys, may now be employed on lower terms than have ever yet been quoted. The rates have certainly never been tempting until now.

George G. Turri places approved patents (no others) effectively before Australian capitalists, with whom he is in touch, and has negotiated many highly important and profitable sales on a purely commission basis.

As delay is often Fatal to Validity, send immediate instructions naming Colonies where patent is required, and enclose one copy of full specifications and drawings to GEORGE G. TURRI, Sun Building, Queen and Bourke Streets, Melbourne, Australia. Send also $60 per Colony. See full particulars and obtain blanks (free) at INVENTIVE AGE Office, Washington. Special rates to profession. Correspondence invited.



The above Straining and Measuring Pot is **FOR SALE** by State Rights or to release out on Royo ty with re iable manufacturers. For terms and full particulars, address.

GEORGE C. STANTON, New Iberia, La.

BUCHANAN BROS.

Manufacturing Opticians.

Oculists' prescriptions a specialty.

1115 F Street, N. W., WASHINGTON, D. C.

NEW BOOK--JUST OUT.

How to Make and Use the Telephone.

By GEORGE H. CARY, A. M.

Illustrated with working drawings; and gives practical directions for building and operating telephone lines. Just the book for anybody interested in this subject. It is the latest book published, and is up to date.

Contents: CHAP. I. The Telephone. II. The Telephone Line. III. How to make Receivers of Simple Construction. IV. Batteries best suited to Telephone Work. V. Magneto Call Bells. VI. Switch-boards. VII. Telephone Troubles and How to Remedy Them.

PRICE, Postpaid, $1.

Address, THE INVENTIVE AGE,
WASHINGTON, D. C.

One of the most interesting and useful books for inventors published. Elegantly bound. **Price 50 cents.**

☞ The above book and the INVENTIVE AGE one year, $1.35. Address

THE INVENTIVE AGE,
Washington, D. C.

ROSE POLYTECHNIC INSTITUTE,

Terre Haute, Ind. A School of Engineering, Mechanical, Electrical, Civil Engineering, Chemical courses. Well endowed. Extensive Shops and Foundry. Modern equipped Laboratories in all departments. Expenses low. Address C. L. MEES, President.

GEO. M. SLYE,

General Collector of Bills and Claims.

Inventive Age Bl'dg, 8th and H Sts.,
WASHINGTON, D. C

Satisfactory References Furnished.

TELEPHONE 1516.

GATCHEL & TOMPKINS,

Tailors and Importers.

418 12 STREET, N. W.,

WASHINGTON, D. C.

JUST PUBLISHED.

Dynamo Builders' Hand-Books.

By A. E. WATSON.

No. 1. How to Build a ¼ Horse Power Dynamo or Motor.

No. 2. How to Build a ½ Horse Power Dynamo or Mortor.

No. 3. How to Build a 1 Horse Power Dynamo or Motor.

No. 4. How to Build a 1,000 Watt Alternating Current Dynamo or Motor.

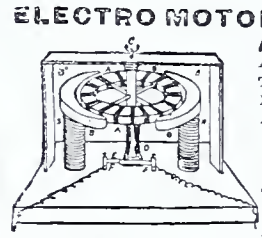
Each Book Contains FULL WORKING DRAWINGS and INSTRUCTIONS for BUILDING the DYNAMO or MOTOR.

Price 50 cts., Postage Free.

BUBIER BUBLISHING CO.

P. O. Box 309. LYNN, MASS.

ELECTRO MOTORS; HOW MADE AND HOW USED.



A HANDBOOK FOR AMATEURS AND PRACTICAL MEN BY S. R. BOTTONE. AUTHOR OF "THE DYNAMO," "ELECTRICAL INSTRUMENT MAKING FOR AMATEURS," "ELECTRIC BELLS," ETC., ETC. AND A. M. A. BEALE, AUTHOR OF BEALE'S CALISTHENICS, ETC.—A complete and simple explanation of the source of the power in a dynamo and the method of applying the same, commencing with a Simple Motor, and proceeding to an exposition of the Siemen's, Thompson's, Walker's, Grison and other motors.

In addition three special chapters by an American author follow in which the information embraces all American improvements. The work is probably the most complete and easily understood of any of the many now in the field.

180 PAGES, CLOTH, PRICE.....**75 cts.**

With "Inventive Age" one year, $1.50.

Mason, Fenwick & Lawrence,

PATENT LAWYERS,

Solicitors and Experts.

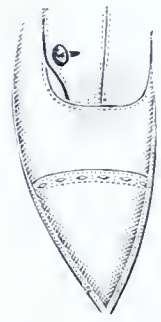
602 F St., Washington, D. C.

Established 1861.

References: Dr. Jas. C. Welling, President Columbian University, Washington, D. C.; Hon. John T. Morgan, Hon. John T. Heard, Gen. W. S. Rosecrans and many others.

24 Page Book Free.

Shoes by Express $3.50.



Send your name, address, size of shoe, width, and a pencil outline of your stocking foot, also, style of toe preferred broad, medium or pointed, and $3.50, and we will send you (express prepaid) a pair of our fashionable russet or black true-comfort shoes. Please mention "Inventive Age" in answering this advertisement.

$3.50 & 5.00 SHOES

Wilson's

929 F Street, Northwest,
WASHINGTON, D. C.

THE WASHINGTON LOAN AND TRUST CO.

FIRE-PROOF GRANITE BUILDING.

PAID-UP CAPITAL $1.000.000.

Organized under act of Congress and under the supervision of the U. S. Government.
Furnishes first-class investments.
Executes trusts. Loans money.
Pays interest on deposits.
Rents office rooms and safe deposit boxes.

OFFICERS.

JNO. JOY EDSON, President.
JNO. A. SWOPE, Vice-President.
JNO. R. CARMODY, Treasurer.
ANDREW PARKER, Secretary.

J. SCHULTZBACH,

Mechanician and Model Maker,

Models for Patents and Experiments.

Electrical and Meteorological Instruments and light machinery of every description made to order.

713 6th St., N. W., WASHINGTON, D. C.

CROWN FOUNTAIN AND GOLD PENS.

MEDALS AND DIPLOMAS

at COLUMBIAN EXPOSITION, Chicago.
MIDWINTER FAIR, San Francisco.

CROWN PEN CO., Manufacturers,
78 STATE STREET, CHICAGO.

THE COLUMBIA NATIONAL BANK,

911 F Street, N. W.,
WASHINGTON, D. C.

A General Banking Business Transacted.

Accounts of Individuals and Corporations Solicited.

CAPITAL $250,000.
SURPLUS $100,000.

E. S. PARKER, ... *President.*
A. F. FOX, ... *Vice-President.*
CLARENCE CORSON, ... *Cashier.*

And What Do You Think of This?

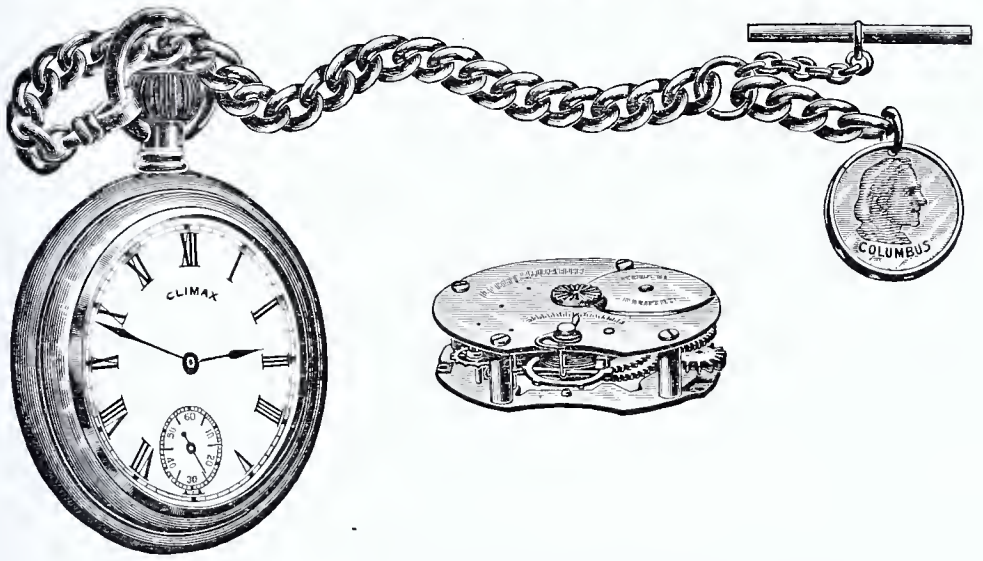
JUST OUT! BRAND NEW! ENTIRELY ORIGINAL!

$2. An American Stem-Winder.

A DUPLICATE IN QUALITY, APPEARANCE SIZE, ETC., OF ANY AMERICAN WATCH SOLD FOR LESS THAN $10.00

Our Watches are Positively and Unequivocally Guaranteed.

THE CLIMAX



EITHER ARABIC OR ROMAN DIAL.

This is the CLIMAX up to date. It represents the most important step taken in Watch evolution in many years. It describes a line beyond which nothing radical will pass for years, not only in the matter of PRICE, but QUALITY. The movement comprises many original patented features, and has been for years the subject of constant labor by one of the foremost of the foremost of expert and inventors.

DESCRIPTION.

CASES.—Two Styles, Plain and Imitation Engraved. Two Finishes, Solid Gilt and Nickel. Two Dials, Roman and Arabic. Snap Back. Heavy Bevel Crystal. Regular Stem Wind. Inside Stem Set. Regular 18 size Case. Chains assorted in each dozen.

MOVEMENT.—Regular American Lever, Lantern Pinion, Quick Train, 240 Beats per Minute Three-quarter Plate, Short Wind, Runs 30 hours to one winding. Dust Cap over Movement. Fully Timed and Regulated, and FULLY GUARANTEED for one year, the same as Waltham or Elgin.

The Cheapest Stem-Winding Watch Ever Produced.

PRICE $2. With "THE INVENTIVE AGE" one year, $2.50.

JUST PUBLISHED.

How to Build a One-Fourth Horse-Power Motor or Dynamo.

By A. E. WATSON.

Illustrated with full working drawings.

PRICE, PAPER, 25 CTS. CLOTH, 50 CTS.

Address "INVENTIVE AGE," Washington, D. C.

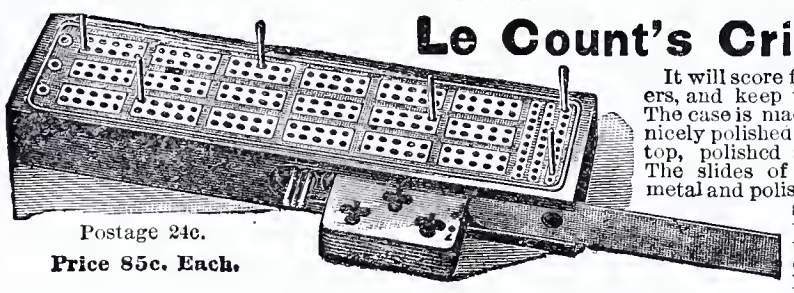
THE STAR FOUNTAIN PEN.

A solid 14 karat gold pen in highly finished hard rubber holder. The only fountain pen that will give perfect satisfaction, sold at less than $2.50. We warrant it in every particular and refund money when it is not satisfactory. A gold pen alone of the same value costs in any retail store more than we charge for the whole outfit. Writes 25 pages fools cap to one filling.

By mail, **$1.50** each; **$12** per dozen.

With "Inventive Age" one year, $2.

Le Count's Cribbage.

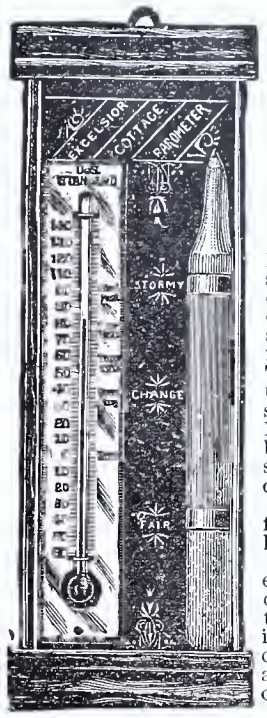


Postage 24c.

Price 85c. Each.

It will score for three or six players, and keep tally of the games. The case is made of black walnut, nicely polished; has a solid metal top, polished and nickel plated. The slides of compartments are metal and polished. This Board is superior to Boards that sell for three times the price. Full directions with each Board.

With "Inventive Age" one year, $1.60.



THERMOMETER & BAROMETER COMBINATION.

Combination Barometer and Thermometer.—Our well known leader. Blue and Gilt back with metal side posts. Fancy top and bottom and handsome enough to decorate the home of a millionaire. Extra well made and dependable on for showing changes in both weather and temperature. One of the biggest bargains in our list. A handsome thermometer, together with a glass tube containing a chemical preparation which rises and falls by action of the atmosphere, foretelling correctly all changes in the weather. This is a new style storm glass and the most reliable ever known, being in use in all signal service stations. The slightest change in the atmosphere in some way affects this glass. The thermometer is also of the best quality. Both are enclosed in a stand with walnut top and bottom and blue and gilt back. On either side is also a strong metal bar giving the whole great strength and adding to its appearance. Altogether it is a most remarkable combination for the price and we take pleasure in offering it to our patrons

This is not one of the many cheap combinations of which the market is flooded which are neither good for ornament or use and can never be relied upon to forecast either the weather or in fact any thing else.

There is no reason for you to depend on the weather Bureau reports as every person who owns one of our Combinations, can make his or her forecast and tell exactly when it will be fine, rainy and in fact every change in the weather. With this you can tell whether to put on rubbers and a mackintosh or a pair of summer shoes and a costly dress. Don't take any more chances about the weather but be prepared. Each one packed securely in a neat box so that they can be mailed up without any fear of getting broken or damaged. Postage 10c. **Price 32c. Each; $3.00 Doz.**

With "Inventive Age" one year $1.25.

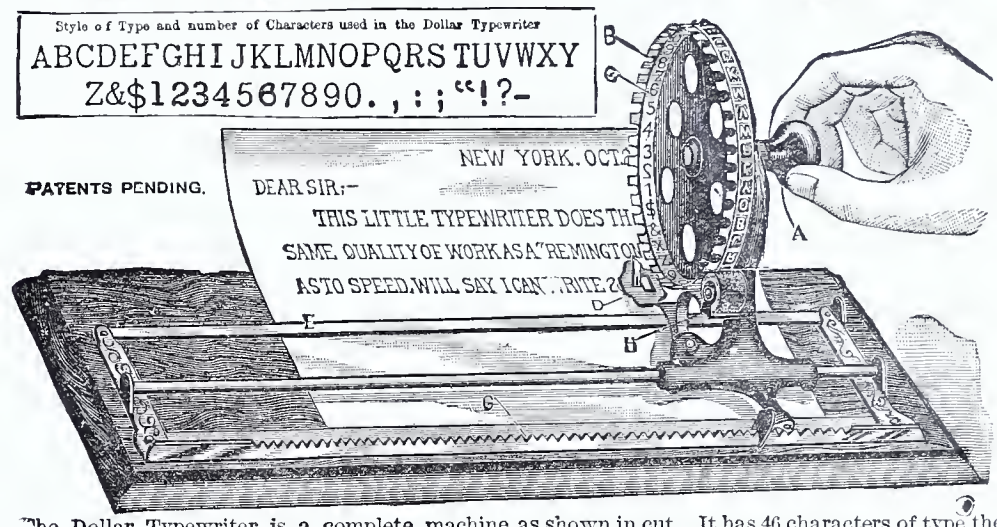
THE DOLLAR TYPEWRITER.

A PERFECT TYPEWRITING MACHINE.

Price only $1.00 by Express; $1.15 by Mail.

Style of Type and number of Characters used in the Dollar Typewriter

ABCDEFGHIJKLMNOPQRSTUVWXY
Z&$1234567890.,:;"!?-

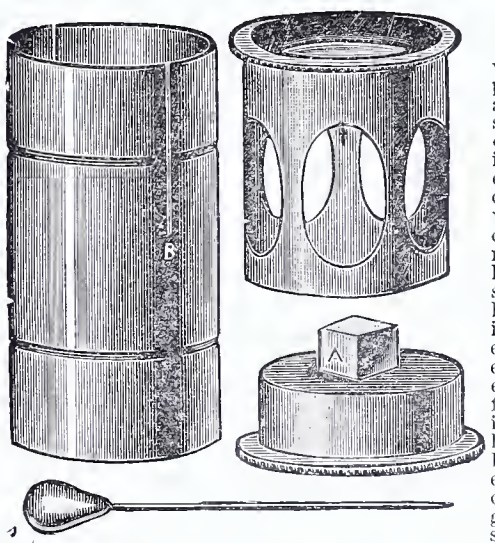


The Dollar Typewriter is a complete machine as shown in cut. It has 46 characters of type the same as that used on a Remington. It is provided with numerous patented devices for inking the type, holding the paper, spacing and governing the impression and allignment. It will write a postal card, note or full letter sheet and is particularly well adapted to addressing envelopes. It is a practical illustration of what a rare combination of ingenuity, skill and capital may do as it embodies many difficult and expensive mechanical movements which were heretofore only possible in high price machines. Over a **QUARTER MILLION** of these machines have been sold within the last year and the secret of its great success is that the manufacturers commenced with a foundation of original ideas and then spared no expense in putting them to practice by the use of the best machinery to be devised. If no more could be said of it this Typewriter is worth many times its cost as an instructor of children teaching and amusing at the same time, but its features of practicability commend it to the use of nearly everyone and the sale it has had and will have is not surprising. It **IS A PERFECTLY CONSTRUCTED** machine that will do work equal in quality to any of the high priced machines. It is so **SIMPLE** that a **CHILD CAN OPERATE IT** and will not get out of order. It is **LIGHT** and **PORTABLE**—just the thing for travelers. It is very **ATTRACTIVE** in appearance, made entirely of metal, mounted on a highly polished hard wood base. It will **WRITE RAPIDLY** with practice—15 to 25 words a minute. We **GUARANTEE** every claim for it, and if not as represented **REFUND MONEY.** The **PRICE** is but **ONE DOLLAR!** This is the age of typewriters, and no one should be without one.

Any typewriting that may be done with any of the high priced machines, from $100.00 down may be done with this one. It is now possible for **EVERYONE** to own a Typewriter and address and write their letters, postals, etc., in the same way the richest firms do theirs. The monopoly in Typewriters died when **"THE DOLLAR"** was born. Postage 15c. **Price $1.00 Each.**

With "Inventive Age" one year, $1.75.

COMBINATION MICROSCOPE.



Scientific skill and the greatest perfection in workmanship coupled with a very high magnifying power, distinguish this handsome microscope over all others ever offered at popular prices. It is specially imported from France, and readily sells for one dollar at retail. As regards power and convenience of handling, good judges pronounce it the best ever introduced for popular use. The cylindrical case is manufactured from highly polished brass, while there are two separate lenses—one at each end of the microscope. The larger glass is a convex magnifier, adopted for examining insects of various kinds, the surface of the skin, the hair, fur or any small articles. It will magnify the hairs on the hands or arms till they resemble large ropes, and it is a most interesting companion. The other lens is exceedingly powerful, and will clearly delineate every small object, entirely invisible to the naked eye such as the animalcules in a drop of water, fishes, feathers and the minutest insects. An interesting illustration of its great power may be had by placing a drop of sour flour paste upon the bottom of the lens, when on looking through the eye-piece, the sight of the writhing mass of thousands of worms, snakes and eels, is one never to be forgotten. Thousands of living animalcules can be seen in a single drop of stagnant water. An insects eye is a very beautiful object when seen through this microscope. It reveals hundreds of small eyes or six sided faects resembling net work or honeycomb, which enables the insect to see in all directions without moving its head. There are 4,000 of these little eyes in the single eye of a fly. It is invaluable in detecting adulterations in food, such as flour, tea, coffee, sugar, spices, milk and the fatal trichina spiralis or pork worm. Postage 3c. **Price 47c. Each.**

With "Inventive Age" one year, $1.35.

The Inventive Age
AND INDUSTRIAL REVIEW

A JOURNAL OF MANUFACTURING INDUSTRY AND SCIENTIFIC PROGRESS

Sixth Year. No. 6. | WASHINGTON, D. C., JUNE, 1895. | Single Copies 10 Cents. $1 Per Year.

Fabrication of Matches Abroad.

The recent strike of 700 match factory employes in France has called attention to the peculiar difficulties and hardships attending their manufacture in that industrious republic.

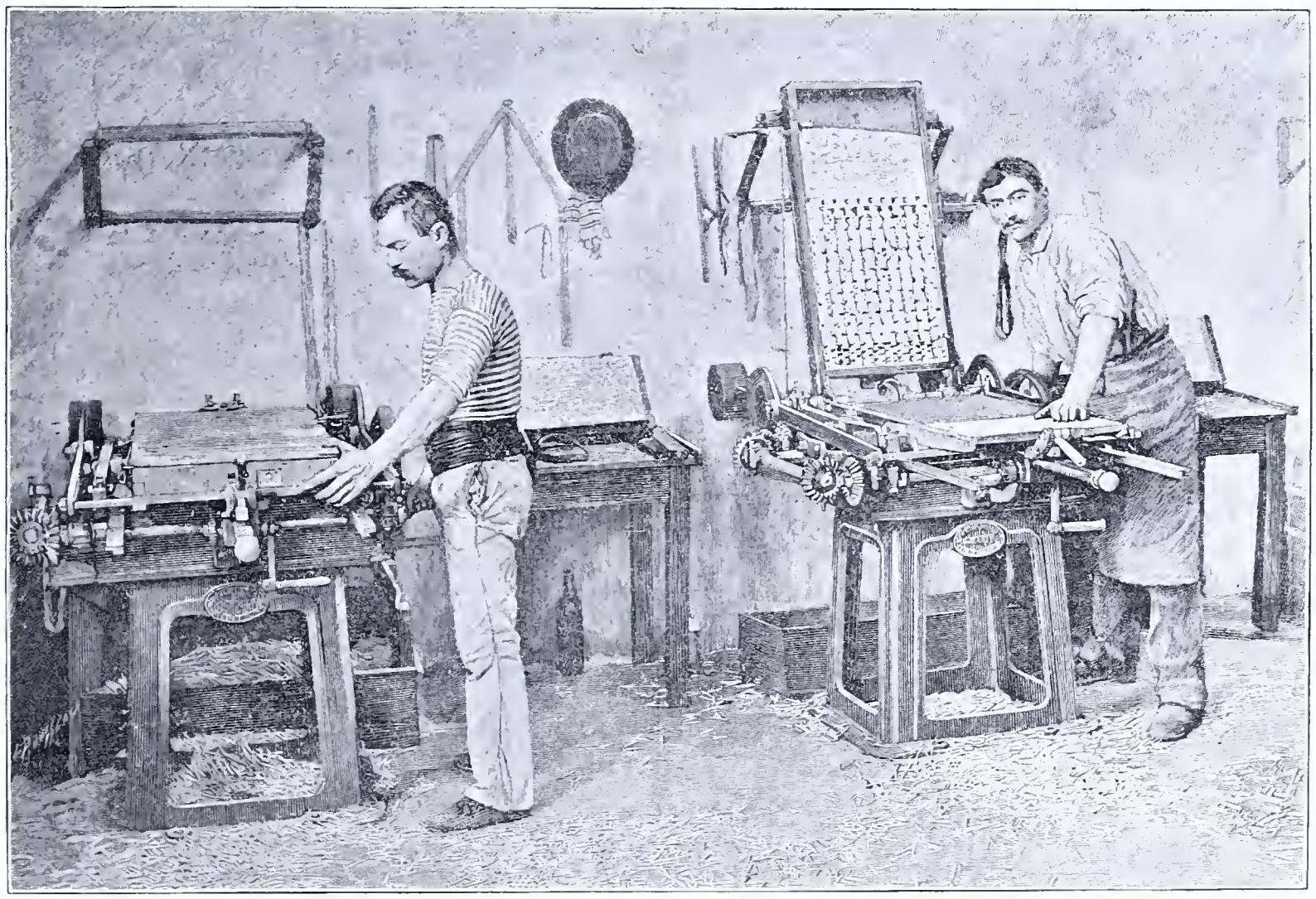
We all know how "matches" are made between the sexes by supervising parents in *La Belle France*, and how many cases of unhappiness are boxed up in domestic circles in consequence, but few of us on this side of the ocean are conversant with the methods employed in that country in making those little wooden sulphur tipped necessities of the household and the smoker.

It is only 60 years since it was necessary to whack the knockers of ten houses to find a blaze of any kind, unless it was meal time. In those days in parts of France, the tinder-box was employed and it had been in use for centuries. The variations of the fire-flint were numerous before the tinder-box came into use. Then came the compressed air tinder-box; the electrical tinder-box; the friction tinder-box; the rotary tinder-box, and finally the phosporus tinder-box which was a near relation of the match we now employ.

In Austria in in 1833 phosporus was first used as an aid to match manufacture.

They were so inflammable that the jolting of the carriages which transported them from place to was sufficient to cause them to take fire, and their usage was suppressed by an edict of the state. In 1840 Preshel invented his famous paste compound of chlorate of potash, phosporus and Prussian blue. Later the same chemist replaced the chlorate by peroxide of lead, which avoided the noise of explosion. Flints, tinderboxes, steels, fuses, all were relegated to the domain of the past when appeared the little sliver of wood with the luminous end which is now the indispensable companion of civilized man.

Before being ignited, the common match, as we find it in all kitchens, has to submit to half-a-dozen operations: The wood or stock is prepared and cut up into proper sizes, in several places in France and also in Russia, by cutting machines which produce as high as 300,000 sticks per hour. The Russians use the aspen tree for material, but, generally, poplar and fir are employed in France. In a factory such as the one at Pantin, a cut of one of the rooms of which is shown herewith, about 24,000,000 matches are prepared daily. The dainty little pieces of wood are first arranged in a square iron frame, similar to those used by printers. Each row is isolated by felt, and the matches are thus independently aligned and present their little virgin heads immaculate. These frames are called "presses" and contain about 7,000 matches each. A miniature railway with carriages conveys the presses to the room where the sulphur and compound is applied. The accompanying illustration gives a view of the work in progress.



SCENE IN FRENCH MATCH FACTORY.

This chamber should be described by Dante. As you enter the fumes seize you by the throat and nose and you wonder if the unfortunate ones who work there are shades or human beings! In a corner is a large vat filled with liquid sulphur, a workman leans over it and dips one of the presses in the liquid and then deposits it on the table to dry. In another corner upon metal tables is extended the phosporescent paste, and the "shade" seizes the presses as they are borne to his table, presses them head down into the mass. Each stick is thus crowned with a little red capsule and takes henceforth the name of match. Immediately after this application the presses are taken to the room of the trimming woman, This place is as "infernal" as the other, but the pretty faces of the shades reassure you. Each machine is controlled by a French maiden who can turn out about 150 presses per day. Often, in summer, the place gets on fire, but in the midst of such extremely combustible material extraordinary precautions are taken and the damage is reduced to a minimum. The premium demanded by insurance companies is, however, so high that the management generally insure themselves. Boxing ordinarily is done both by machine and by hand. Three workmen stand at each machine and the operation is automatically made with great rapidity. In this establishment there are 50 boxers, and 25 trimmers. Then you come to the pasting room where an entirely different noise greets you. You might fancy you were in a girls' school room. The rustle of paper and the cheery sound of feminine badinage as these groups of blondes and brunettes affix the vignettes and titles to the boxes, each one with her little glue pot and brush, is a welcome change from the sulphur laden atmosphere of the preceding rooms.

The management takes measures to prevent asphyxiation and poisoning but the employes seem to

(*Continued on page 91.*)

The Inventive Age

Established 1889.

INVENTIVE AGE PUBLISHING CO.,

8th and H Sts., Washington, D. C.

ALEX. S. CAPEHART. MARSHALL H. JEWELL.

The INVENTIVE AGE is sent, postage prepaid, to any address in the United States, Canada or Mexico for $1 a year; to any other country, postage prepaid, $1.50.

Correspondence with inventors, mechanics, manufacturers, scientists and others is invited. The columns of this journal are open for the discussion of such subjects as are of general interest to its readers.

Technical matter is particularly desired. We want practical information from practical men.

Nothing will be published in the editorial columns for pay.

The INVENTIVE AGE is thoroughly independent.

Advertising rates made known on application. Special facilities for furnishing cuts of any patented article together with descriptive article. Business specials 25 cents a line each insertion, 7 words to the line. No advertisement less than 50 cents.

Address all communications to THE INVENTIVE AGE, Washington, D. C.

Entered at the Postoffice in Washington as second-class matter.

WASHINGTON, D. C., JUNE, 1895.

ST. LOUIS has given the street car companies till September 1st to attach fenders to all their cars. It is hoped an improvement on the monstrosity adopted on some of the lines in Washington will be found.

ENORMOUS quantities of American apples are now being shipped to Europe. In the winter of 1893-94 168,706 barrels were exported and last winter these figures were swelled to the magnificent sum of 1,443,592 barrels.

IN the American Newspaper Directory for 1895 there will be catalogued exactly 2,359 newspapers that have been established since the Directory for the previous year was compiled. The papers that have ceased to exist, within the year, are nearly as numerous as the new ventures.

WHEN the work of the Sault Ste. Marie canal is finally completed, there will be a complete channel for twenty feet from the head of the lakes at Duluth to Buffalo, which will make a difference of about 30 per cent in the carrying capacity of the larger vessels, which can now be loaded only to fifteen feet.

THE China-Japan struggle hardly rose to the dignity of war as compared with conflicts of other nations. Japan sent an army of about 50,000 men into the interior of China and her navy numbered 29 ships. In the entire campaign her loss from disease and battle did not exceed 1,300 lives. Never before did a nation reap so much with so little loss of blood.

REPORTS from commercial agencies indicate gradual and positive improvement in all lines of business. The restoration of confidence is more and more marked each week and the voluntary increase of wages granted by the Carnegie and other companies in the great manufacturing district of Pittsburg has had a wonderfully reviving effect on all industries in New England and elsewhere in the United States.

THE American Association of Inventors and Manufacturers has recently issued a circular letter prepared by a committee of its members, composed of some of the most prominent and influential manufacturers in the country, which will be of interest to all our readers. The work the Association is doing is of great importance to every inventor and manufacturer, and should receive their co-operation. The report is printed on another page of this paper.

ON the rehearing before the United States Court the income tax law was overthrown. Four of the Justices favored the law, and five, including the Chief Justice, decided that the provisions of the measure were unconstitutional. Chief Justice Fuller wrote the opinion of the court and dissenting opinions were read by the minority, that of Justice Harlan being probably the most vigorous arraignment ever presented from the minority side of the Court on any question. The five against the law were Chief Justice Fuller (Dem., Ill.) and Justices Field (Dem., Cal.), Gray (Rep., Mass.), Brewer (Rep., Kansas), and Shiras (Rep., Pa.); for the law, Justices Harlan (Rep., Ky.), White (Dem., La.) Brown (Rep., Mich.), and Jackson (Dem., Tenn.); Justice Shiras having changed his views since the first hearing.

A DISGUSTED manufacturer, who evidently has been worsted in an infringement suit to sustain the validity of an acquired patent, recently wrote the American Machinist that hereafter he should not fight a patent case, pay a lawyer a dollar, or anything but a nominal price for a patent to the inventor, unless forced to. The most significant portion of his remarks, however, is that wherein he advances the idea that it would serve the ends of justice better if, in infringement cases, the burden of proof were thrown upon the alleged infringer. This would, of course, be a revolutionary and dangerous proceeding. The American Machinist commenting on the matter, declares that nothing is more certain than that our patent laws need revision, but they should be revised by the friends and not the enemies of the patent system. The necessity of obtaining good patents, and the benefits that accrue therefrom to both the inventor and the manufacturer who buys and uses patents, will be appreciated. The Machinist truly concludes that "it seems proper to say that the skillful drawing up of specifications and claims for a patent is no trifling matter. It should not be intrusted to anyone who comes handy, nor to those who grind them out by machine methods, with a force of irresponsible and ignorant clerks to do the work. More careful selection of patent attorneys, and a more general recognition of the fact that more and better paid talent should be employed in the preparation of patent applications, would go very far toward removing some of the causes of dissatisfaction with the patent system.

The Fallacy of Free Silver.

The argument put forth by an advocate of free silver that "values are measured by and expressed in dollars; hence if we should cut the amount of gold in two and make 11.1 grains of pure gold a unit or dollar, we would thereby double the value of all the property in the United States except debts," causes the Iron Age to explode the fallacy in language and argument easily understood and convincing. It says:

Nothing could show more strikingly the false logic that is almost inseparable from all the reasonings of the monetary revolutionists. All values are measured by the dollar. If we substitute for the present dollar one of half the value we double all values. Not at all; that conclusion does not follow from the premises. We only double the number of times the measure is contained in the thing measured, which is a matter of no consequence. We measure distances in miles. If we adopt a mile of 2640 feet, do we double distances? We have doubled the number of miles, but the distance is unchanged. If we make two pecks a bushel we double the number of bushels of grain in the country, but we have not affected the quantity of grain in the least.

But it still may be insisted that, though we cannot affect the quantity of property in the country, we may double its value by doubling the number of dollars which represent the value. Over these terms the speculative political economists have plunged into depths of thought and reasoning whither it is needless for practical men to follow them. But it is plain enough to every man who will look the fact in the face that, while the price of an article in dollars might be doubled by declaring a 50-cent piece to be a dollar, nothing whatever would be gained by the mere change of numerals. The value would not be changed. If an article is worth $10, it is the same as saying that it is worth 248 grains of standard gold. Now, it is certainly immaterial whether the price of the article be expressed in $10 or 24.8 grains each or in $20 of 12.4 grains each; the amount of gold, the amount of iron, the amount of wheat, the amount of cotton, the amount of labor the article will exchange for, or that may be purchased by the money it sells for, remains unchanged.

These are matters of elementary arithmetic. It seems as if they ought not to be offered to men without an apology, and yet the fact that intelligent men take seriously the proposition that all values in the United States may be doubled by halving the dollar shows how great is the need of more thorough teaching of elementary arithmetic.

The truth is that each man who is imposed on by this shallow sophistry fixes his attention upon the doubling of the price of that which he has to sell and overlooks the like effect upon the price of everything he has to buy. What would it profit a farmer to get twice as many dollars for his cotton or his wheat if each dollar would buy only half as much as it does now? The Frenchman and the German who fix their prices in large numbers of francs and marks, and the Portuguese who fixes prices in thousands of "reis" are not more prosperous than the American who fixes prices in a coin worth five francs or four marks, or an Englishman who fixes prices in a relatively small number of pounds.

As the complaint of low prices comes mainly from the farmers, and the value of their products is fixed to a very large extent in foreign markets in competition with the world, the futility of trying to double values by halving our local measure of value is too plain for argument. If there were anything in the multiplication of wealth by the division of the measure, we ought not to double our fortunes; we ought to increase them a hundred-fold by reducing the dollar to the value of a cent. Our national wealth would then indeed transcend the dream of avarice.

To Europe in Three Days.

There was recently on exhibtion in Washington the miniature model of a vessel designed by the inventor, Mr. Richard Painton, to cross the Atlantic in three days. The stern propellers are three-bladed, two on a shaft, about two diameters apart. The blades are set so that the blades of the rear propeller cover the space between the blades of the one in front of it. Thus, the inventor claims, with less friction than is developed by a four-bladed propeller, he gets all the advantages of six blades, and if the ship pitches side-wise, so that two blades come out of the water, there are three blades still at a working angle under the surface. In addition to the double propellers on the shafts at the stern, there is a corresponding pair at the bow, which the inventor says will not only add to the speed, but will steady the vessel in rough weather. Besides these two sets, there are four side sets of propellers, four on each side, and connected through the hull like old-fashioned paddle wheels. Instead of being the old duck-foot type of wheel, however, they are regular screw propellers, to work under water. Their shaft is set at right angles to the keel of the vessel, but by the peculiar cut of the propeller blades and their peculiar pitch, they drive the vessel forward.

With steam connections it would be impossible to operate all of these complicated sets of propellers, and the inventor uses his main engine merely to generate electricity, and applies this to a separate motor to operate each of the eight shafts. The shafts themselves are wound to form the armatures that revolve in a gigantic magnetic field, and the inventor says that he can, if necessary, develop 100,000 horse-power for a single vessel.

The working model now on exhibition is eleven feet, nine inches long, and is soon to be supplied with electric motors to give it a practical test in the water.

Review Table.

The Street Railway Journal, of New York and Chicago, issues but once a month, but it is so complete in all its departments relating to construction, equipment, operation and condition of all street car lines in the country and the organization and condition of street railway companies generally that it holds undisputed first rank in the field of trade journalism relating to the subjects treated. It is a monster magazine, carefully edited, splendidly illustrated and generously patronized.

* * *

Following the organization of the Home University League, of Chicago, is the establishment of a magazine called "Self Culture," a magazine of knowledge, devoted to the interests of the League. In the announcement of the aims of the League, it is stated that "prior to its organization there was not an institution in existence that catered to the universal want which it supplies, its object being to encourage on the part of its members daily investigations of urgent questions, and the systematic study of human progress. It is a sort of universal intelligence bureau, imparting reliable and complete information to all its members throughout the country. The terms of membership are $4 per year, which entitles each member to full privileges of the two departments, "Inquiry" and "Study of Human Progress," and also to the magazine. The latter publication singly costs $2. All certificate holders in this League, upon sending a 2-cent stamp for reply, will be given such information as he desires upon any subject. The reliability of the organization will not be questioned when it is considered that it is founded and maintained by The Werner Company of text book fame, with a capital of over $3,500,000.

* * *

With the compliments of the Passenger Department of the Baltimore and Ohio Railroad comes to hand an interesting little booklet descriptive of those delightful summer resorts on the main line of the road up in the Alleghanies, Deer Park and Oakland. These resorts are well known and lavishly endowed by nature with charming environments. The regular season at Deer Park opens June 22 and at Oakland July 1.

NOTES.

The Spider's Thread.—The spider is so well supplied with the silky thread with which it makes its web that an experimenter once drew out of the body of a single specimen 3,480 yards of the thread—a length but little short of two miles. A fabric woven of spider's thread is more glossy than that from the silkworm's product, and is of a beautiful golden color.

* * *

Largest Derrick in the World.—In the Taynton Granite quarry, at Barre, Vt., is what is said to be the largest derrick in the world. The dimensions given show a mast of ninety-nine feet height, held by ten guys, each running out about 200 feet to heavy anchorages, and the boom can swing around a circle 142 feet in diameter; being built, like the mast, of Phoenix columns, such as are used in structural iron work in buildings, the loads are hoisted by means of a steel wire rope one and a fourth inches in diameter, the boom itself being handled with a similar rope of three-quarters of an inch diameter. Over a mile of steel rope is said to have been used in rigging the derrick, its weight exclusive of the rope, reaching about 50,000 pounds.

* * *

Acetylene Gas.—The marvelous cheapness as an illuminating agent, as compared with ordinary gas, makes the discovery of acetylene gas one of the most important of the age. It has been demonstrated by actual experience that 1,000 feet of acetylene gas is equal in illuminating power to about 12,500 feet of the ordinary gas used in Philadelphia, and as acetylene gas costs only about 25 cents per 1,000 feet, the difference in cost is the difference between $12.50 and 25 cents. A recent test in Washington presented more startling results. It was demonstrated that the gas could be made on an extensive plan for 15 cents per 1,000 feet. This is a non-explosive gas and a tiny jet, using 50 per cent less gas than the ordinary burners and will give double the light.

* * *

Means of Making Sea Water Potable Discovered.—A well-known Austrian engineer, M. Pfister, is announced as having discovered a remarkable property of the trunks of trees, namely, that of retaining the salt of sea water that has filtered through the trunk in the direction of the fibres. He has consequently constructed an apparatus designed to utilize this property in obtaining potable water for the use of ships' crews. This apparatus consists of a pump, which sucks up the sea water into a reservoir and then forces it into the filter formed by the sea trunk. As soon as the pressure reaches 1.5 to 2.5 atmospheres the water is seen—at the end of from one to three minutes, according to the kind of wood used—to make its exit from the other extremity of the trunk, at first in drops and then in fine streams, the water thus filtered being potable, freed, in fact from every particle of the usual saline taste which is such a drawback to water obtained in the ordinary manner.

* * *

Electric Carriages.—L'Energic Electrique draws a glowing picture of France when the electric carriage shall have come into more general use, and when travel in the vehicles which move without the aid of steam or animal power can be used for extensive trips. It describes one of recent make, of which none of the actuating mechanism is in sight. The boxes are stowed away under the seat. The hands are free to steer the carriage and to control the speed; the switch, as well as the brake, is controlled by the foot. The foot is placed on the switch and the carriage starts with ease; on moving the foot the carriage stops and the momentum which it has acquired may be checked, if desired, by applying the foot to the brake. The brake is of the ordinary variety, a wooden shoe binding on the rear wheel, a circuit breaker is placed on the brake pedal, so that when the brake is applied the current is cut off at the same time. On a good level road a speed of 20 kilometers (12½ miles) per hour has been obtained, while in a hilly country the speed is reduced to 12 kilometers.

Deer Park on the Crest of the Alleghenies.

To those contemplating a trip to the mountains in search of health and pleasure, Deer Park, on the crest of the Allegheny mountains, 3,000 feet above the sea level, offers such varied attractions as a delightful atmosphere during both day and night, pure water, smooth, winding roads through the mountains and valleys, and the most picturesque scenery in the Allegheny range. The hotel is equipped with all adjuncts conducive to the entertainment, pleasure and comfort of its guests.

The surrounding grounds, as well as the hotel, are lighted with electricity. Six miles distant, on the same mountain summit, is Oakland, the twin resort of Deer Park, and equally as well equipped for the entertainment and accommodation of its patrons. Both hotels are upon the main line of the Baltimore and Ohio Railroad, have the advantages of its splendid Vestibuled Limited Express trains between the East and West. Season excursion tickets, good for return passage until October 31, will be placed on sale at greatly reduced rates at all principal ticket offices throughout the country. One-way tickets, reading from St. Louis, Louisville, Cincinnati, Columbus, Chicago, and any point on the B. & O. system to Washington, Baltimore, Philadelphia or New York, or vice versa, are good to stop off at either Deer Park, Mountain Lake Park or Oakland and the time limit will be extended by agents at either resort upon application to cover the period of the holder's visit.

The season of these popular resorts commences June 22d.

For full information as to hotel rates, rooms, etc., address George D. DeShields, Manager, Deer Park, or Oakland, Garrett County, Md.

Professional Inventors.

It appears to me that the logical outcome of your argument is, no man ought to attempt to do a thing unless he knows beforehand that he can do it. It seems to ignore the fact that all wisdow is the product of experience, and that we acquire no inconsiderable part of our wisdom from our failures. Most of us would be afflicted with too much swell at the top if we never made mistakes. It has been said that poets are born, not made; it is just as true as to any other calling. If none but born poets were permitted to write verse the world might be relieved. If none but inventors were permitted to invent or try to, time might be economized, but valuable experiences would be lost. The truth is, social progress is a product of emulation. Someone distinguishes himself and others desire to emulate his example. The world then advances, and though some may suffer, the happiness of the mass is promoted.

As a matter of fact, no one knows until he tries whether he can invent or not, and it may be that he will strike a lucky combination as well as his neighbor.

The necessary union of financial expertness and inventive ability to secure success, is not at all to the point. If it has not pleased the Creator to combine these qualities in the same individual very often, proves nothing against the effort to invent. Mr. Hubbard could not invent a telephone, but he could organize a company, and the man who could invent the telephone may have been unequal to the organization of a company. But what of that—Patti can sing, but she must have a manager, and whether he can sing a note or not is immaterial. The truth is we have, by striving, developed in this country a race of inventors, and thousands of them are professional inventors. They may not as a rule earn so much money as "estimators," but it may be taken as quite certain that men by taking thought cannot make of themselves this or that, unless nature has endowed them with the requisite mentality. The good estimators would probably never become good inventors, and in like way the man who has an inventive brain, probably would not learn to be a good estimator.

It is very fortunate for the world that men are so differently endowed, and probably it is equally fortunate that there are few who have mentality to compel success.—*R. D. O. Smith in American Machinist.*

THE United States consumes more coffee than any other nation. The world's consumption is about 11,300,000 sacks.

Frosts in the west and other bad crop indications, coupled with a speculative feeling, caused wheat to jump upward about 15 points during the month.

THE last lot of 12-inch deck piercing projectiles, furnished to the Navy Department by the Midvale Steel Company, were tested at the Sandy Hook proving grounds the 17th ult. The test is reported to have been eminently successful. The shells were required to penetrate a deck plate inclined 60 degrees to the line of fire. Both projectiles fired under these conditions were recovered entirely uninjured after penetrating the plate.

A BURIED city like that of Pompeii is being excavated in Central America at the foot of the volcano Agua. Pottery, fine glass ware, jewels, flint instruments and human skeletons over six feet long have been taken out at depths of fourteen to eighteen feet.

Fabrication of Matches Abroad.

(*Continued from first page.*)

repulse the idea of taking preventives and preservatives. It is a curious thing that the women will not employ them, although the poison, when it attacks them, renders the face and skin ugly and ages them so quickly in appearance. After 30 years of service the state pensions them, but it is only a small pittance they receive.

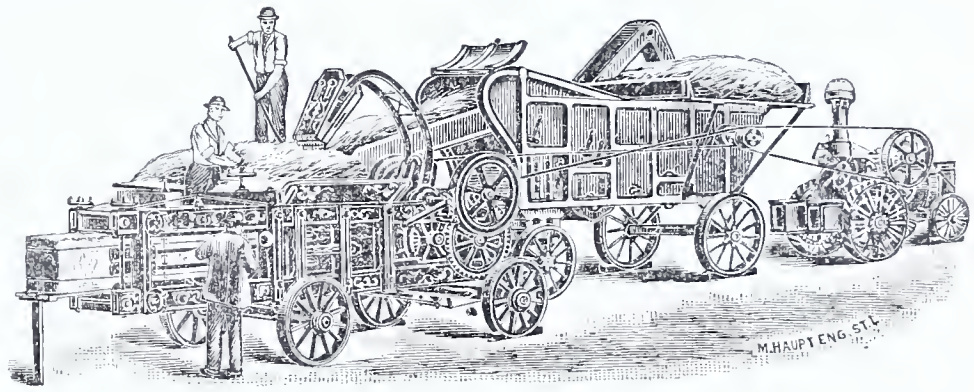
Necrosis is the disease to which they are subject, and physicians say that if the white phosporus were left out, and another kind substituted, the evil would not be felt, but the manufacturer says "I am not in business for philanthropy's sake, the white phosporus is cheaper and I shall continue to use it." The kind of match called by the French "Swedes" are also made by this firm. They are a safety match. The sticks are covered with a paste which does not take fire except when scratched upon the two sides of the box which are clothed with a compound of sulphur of antimony and red phosporus.

The ingenuity of the French is proverbial. They are perfect bees for industry. Their exports are enormous and the whole world is indebted to them for various textiles. Their native energy makes them the richest nation on the globe, and their example is a constant spur to to the rest of mankind.

We are indebted to *L'illustration* for the above description.

Whitman's New Straw Baling Press.

This press has been constructed more especially for baling straw as it comes direct from threshing machines, although it is well adapted to all other work. The frame of press is longer and heavier than the "Invincible," a famous machine made by the same firm, the Whitman Agricultural Co., St. Louis. The plunger has much longer travel; the feed opening is very much larger, and so constructed that the feeding is easily and rapidly accomplished.



The bale tying chamber is also six inches longer than in regular press. The machine is made with either one or two fly wheels, as desired. When two are used, one is attached to the rim of the friction driving pulley, and adds greatly to the power in starting the press when operating. This machine can be run at a very high speed with safety. The gearing is covered with guards to prevent straw from falling among same, and also to guard against accidents. There is a supplementary platform for an extra feeder to stand upon when very rapid work is required. The baler is driven from a pulley on the outside end of cylinder shaft on thresher by a cross belt usually. The driving pulley on press may make from 500 to 600 revolutions per minute, according to the amount of work required. The straw from thresher is deposited on the large feed table of press. When a thresher discharges the straw sufficiently high, a slide may be constructed to convey the straw to press feed table. If this is not the case, a short straw stacker may be used to elevate straw to press. The press will easily bale from three to four tons per hour.

Street Car Fenders.

Interest in the fender problem does not abate, and week after week new efforts to solve it are patented. The total number of patents for inventions of this sort, says Street Railway Gazette, must now be in the neighborhood of 400. All sorts of men apperantly have become convinced of the fact that a fortune awaits the inventor of a successful fender for street cars, and quite a large proportion of the number are evidently persons who have not the slighest conception of the conditions under which street cars are operated on city streets.

What About the "Scientific News?"

Having received several enquiries from inventors as to an alleged publication referred to in circular letters received as the "Scientific News, published at 617 Main street, Buffalo, N. Y.," we wrote to the postmaster at Buffalo, asking if such a publication had a real existence as a regular magazine or newspaper and received a reply as follows: "The Scientific News may be published, but if so is not entered as second-class matter." Possibly the Buffalo address is a branch only, who knows?

Pictorial Telegraphy.

Bell, Edison and other less celebrated electricians have, at different times, given the subject of pictorial telegraphy much thought and in their laboratories extensive experiments have been made. The dawn of 1895 found substantial and encouraging results in this direction, and since that date inventors in San Francisco and Duluth claim to have discovered a practical and inexpensive means of sending photographs over a single wire from one point to another without regard to distance. In that excellent magazine, "Electricity," recently appeared the following article by Mr. Nelson W. Perry, M. E., giving a description of the method used by Mr. N. S Amstutz, of Cleveland, Ohio, and which illustrates the latest developments in this line. Mr. Perry says:

Alexander Graham Bell found that by varying the strength of an electric current in consonance

Fig. 1.

with sound waves he could transmit articulate speech nearly to the ends of the earth.

Edison, Taintor and Bell found that by causing a stylus attached to the center of a diaphragm to which words were spoken to bear lightly upon a revolving wax cylinder they could engrave upon that wax and preserve for all time the characteristics of those words—the undulatory graved line in the soft matrix became the mechanical fac-simile of articulate speech, which required merely a reversal of the process to reproduce the original sound waves. If the diaphragm stylus were allowed to trip over the undulatory graved line it would give out spoken words. If it was caused to vary the strength of an electric current those undulations might be reproduced in sound at a distant point in a telephone receiver, or, by causing this current to actuate an electro-magnetic device, a duplicate engraved record

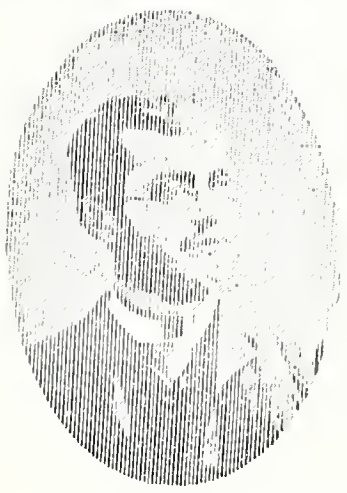


Fig. 2.

could be made in wax at the distant point which could be made to utter again the original words.

The phonograph inscription is the mechanical record of sounds. Can we make a mechanical record of light in all its various gradations? Certainly, and quite as simply.

Many substances undergo changes of solubility which are proportional to the intensity of the light to which they are exposed. One such substance is ordinary gelatine in which is dissolved a little bichromate of potassium. This, when exposed to the action of light, becomes insoluble in warm water, whereas, before such exposure it will be dissolved away. If, therefore, we expose such a plate beneath a photographic negative, those portions which are exposed to the strong light will become totally insoluble; those that are entirely shielded will remain soluble; and those affected by the subdued light—the half tones—will have their solubility affected in proportion to the amount of light received. It remains now only to sponge the plate with warm water to have a photograph in relief wherein the high lights will have the greatest elevation and the shadows will be depressed.

If now this relief photograph were rolled upon a phonograph cylinder and placed upon the machine,

Fig. 3.

its stylus describing a fine spiral path would rise and fall as the picture passed beneath it just as it does when following the phonogram. It is sound, however, that is wanted in this case, but another record at a distance, so Mr. Amstutz causes this rising and falling of the stylus as it passes over the relief protograph to vary in similar manner the strength of an electric current. This undulatory current passing over an ordinary telephone or telegraph wire actuates a similar stylus at the further end which, bearing upon a revolving wax cylinder, engraves in the wax an exact reproduction in elevation of the path over which the first stylus has passed. From this cylinder an electrotype may be taken, flattened out and placed upon the press, and it is from such that the illustrations herewith produced are made.

The graving tool is made V shaped so that as it cuts deeper it cuts wider, and in printing produces blacker lines.

If we follow the process we see that the relief photo in gelatine printed from a negative is a positive. This may be reproduced at the distant point either as a positive or as a negative. Both forms of reproduction are shown to better illustrate the process.

Fig. 1 is a reproduction from a photograph by the ordinary half-tone process of a portrait of the inventor of the artotype, Mr. N. S. Amstutz. Fig. 2 is a reproduction from the same negative made by Mr. Amstutz last summer by the artotype process. To better illustrate the progress of the art since our first description we give Fig. 3, which is a reproproduction of a portrait of the same gentleman made in 1891 and printed in our issue for November of that year. The principles involved in both are the same, but the mechanical execution is far more perfect in the later than in the earlier work.

Through the kindness of Mr. Amstutz we are also able to give another series of cuts illustrating the art which are exceedingly interesting.

Fig. 4 is a half-tone reproduction prepared by ourselves of little Lord Fauntleroy and his dog. From the *same original* were produced Figs. 5 and 6—these by the electro-artograph. Fig. 5 is a negative reproduction such as before referred to. In this the marks of the graving tool give prominence and everything is reversed, viz: the portions of the lines which in the positive print black here print light, and vice versa. If this were printed in white ink on a black background the lights and shadows would come out in their proper relations. The ordinary ferrotype pictures are reproductions of a similar kind, and the writer possesses a picture from this same cut printed in silver on a black card. The effect is superb and resembles a photograph on white satin. Fig. 6 is a positive from the same original and shows the finished results obtainable after telegraphic transmission over a single wire.

Fig. 4.

These last two reproductions are made from engravings having 80 lines to the inch. The half-tone from the original (Fig. 4) is made with 120 lines, and shows the finer gradations of light; but these effects are entirely within the compass of the electro-

artograph, as it has recently been constructed to produce the same fineness of lining, and the writer receives too late for reproduction in this article a sample of such work which is beautiful in the extreme.

For ordinary newspaper reproductions, however, this extremely fine work of 120 lines to the inch is not desirable, since the delicate effects are all lost in hasty presswork and poor paper.

But the great utility of this process lies in the fact that it is almost entirely automatic. The relief photo must, of course, be prepared and wound on the cylinder by hand, and the machines at both ends of the line started up, but the tracing of the transmitting stylus and the engraving on the receiving cylinder proceed without further attention.

As to the time occupied in this operation, Fig. 3 was transmitted and engraved in 10 minutes, while Figs. 5 and 6 occupied only 3 minutes' time.

In conclusion I will say that Figs. 5 and 6 were made from electrotypes from an original engraving marked "F," deposited with the Smithsonian Institution at Washington, D. C.

Elements of Motion.

There is no force in matter. All force is the tendency of every particle of matter to establish and maintain itself in the most agreeable relations to every other particle of matter. An ancient and not improbable conception of matter is that in its rudimentary state it consists of but two constituents, or of one radical in two states, corresponding to positive and negative. All substance is referred to one or two rudiments. Elements are such compounds as are at present irreducible; they are composed of the rudiments in various forms of combinations and recombinations. Atoms are the theoretically indivisible particles of the rudiments. Elementary atoms are the practically indivisible and inseparable particles of the elements. Molecules are the smallest parts into which any substance may be divided and yet retain its individual properties. There is no matter without properties; properties are things; there are things which are not matter; attraction is a thing which is not matter, but a property of matter. There is no thing, not even an imaginary line, that is disassociated from matter. Gravity is the inclination of every particle of matter to approach every other particle of matter. Cohesion is the tendency of particles to cling to particles of the same substance with which they are in immediate contact. Expansion is the occupation, by particles, of more than their original space. Contraction is the occupation of less space. All forces are antagonistic; the triumph of one is the subjugation of the other. Motion results from the conflict of forces; when one overpowers another, movement ensues. All mechanical movements may be traced to these general principles.

New Experiment in Telegraph Wire.

The Western Union Telegraph Company is having, as an experiment, a special wire stretched along its poles from New York to Trenton. This special wire is of much lighter weight than the ordinary wire, weighing but 110 pounds to the mile. It has a steel core and a copper covering, and it is being made by the Roebling Company, of Trenton, N. J., the firm made famous through its connection with the building of the Brooklyn bridge.

The weight of the average wire used by the Western Union Company is 280 pounds to the mile. The life of a wire, barring cyclones or continuous inclement weather, is placed by experts at about twelve years, if running along a turnpike; if placed along a railroad or through a section of a city where soft coal is largely used, its term of usefulness is much shortened and it lasts but a few years, the gases seeming to corrode it.

Should this special light wire have the necessary tensile strength and proper conductivity also it will not only mean a monetary saving, but that more wires may be placed without strain on the poles. There are forty poles to the mile between Jersey City and Philadelphia, along the line of the Pennsylvania Railroad, and forty wires also. These poles last but a short time. They cost about $3 each, cut, trimmed and shipped. Each pole is eight inches in diameter at the top. Chestnut is the wood chiefly used. It is abundant. If the delivery of all the poles could be so regulated that it would not be necessary to cut them until all the sap was out, that is in the fall, a forty-foot pole, eight inches wide at the top, should last twenty years, at the very least.

Stockings are first mentioned in literature as being already worn in Italy about the year 1100 They are alluded to as a great invention and far superior to the former practice of wrapping the feet in cloth bandages.

Ante Dates Robert Fulton.

It is said that the records of Jefferson County, W. Va., prove what is not generally known, that Robert Fulton was not the first man to build a steamboat in this country. He was anticipated over twenty-two years by James Rumsey, of Charleston, Va., now West Virginia. Rumsey's steamboat was partly constructed in Frederick County, Md., in 1785. It was fitted up with machinery partly manufactured at a furnace called "The Cococtin Furnace," owned by Johnson Brothers and located near the town of Frederick.

The two cylinders, the boiler, pumps, pipes, etc., were built in Baltimore. Part of the work was done at the old Antietam Iron Works. Rumsey's boat was eighty feet in length and it was propelled by an engine which worked a vertical pump placed in the center of the vessel. The water was drawn in at the bow and forced out at the stern through a horizontal pipe. The entire weight of the machinery was 665 pounds and the tonnage of the vessel was three tons. The entire machinery, including the boiler, etc., took up a space of very little over four feet square.

The first public experiment took place on the Potomac river on March 14, 1786, when the boat showed a speed of four miles an hour up stream. The records of Jefferson County also show that George Washington and Gov. Thomas Johnson, of Maryland, were among the patrons of Rumsey, and that the experiment was made in the interest of the then proposed Chesapeake and Ohio Canal.

Fig. 5.

Fig. 6.

For many purposes, paper, next to wire, is an excellent insulation, and it has of late come extensively into use in telephonic and other cables. But it is not generally known that such an insulation has been tried under water. This is, however, the fact, and one such cable is now doing excellent work at the bottom of the Hudson river, at New York, right in the track of all the domestic and seabound traffic. Of course the cable is lead covered and otherwise protected, but it depends for its insulation, electrically, on thin spirals of paper around each stranded interior wire.

The grave of Eve is visited by over 40,000 pilgrims each year. It is to be seen at Jeddah, in a cemetery outside the city walls. The tomb is 50 cubits long and 12 wide. The Arabs entertain a belief that Eve was the tallest woman who ever lived.

The Great Siberian Railroad.

The following interesting account and the two accompanying views from the American Engineer and Railroad Journal, showing the progress of this great work, will interest many of our readers. The opening of this line, combined with the results of the Japanese-Chinese war, will be an epoch in the world's history the ultimate result of which no one can even imagine. The construction of the Great Siberian Railroad has entered upon a new phase. Up to the present time it has been controlled by the Siberian Railroad Committee, presided over by the successor to the throne, Nicolas. In the twentieth session of the committee, however, which was the first after the Czarevitch Nicolas had ascended the throne, the new Emperor proclaimed that he would retain the presidency of the committee in the following language:

"Gentlemen, the institution of the construction of a continuous Siberian railroad is one of the great deeds of the glorious reign of my unforgotten father. To complete, with the help of God, this exclusively pacific and civilizing enterprise is not only my holy duty, but my hearty desire; the more so because it was intrusted to me by my dear father. I hope, with your assistance, to rapidly complete the construction of the Siberian Railroad, which was commenced by him."

Then the preparatory commission for the auxiliary enterprises connected with the construction of the Siberian Railroad appropriated 351,000 roubles for the emigration of casaks (half settlers, half soldiers) from European Russia in the Amour territory, and 86,000 roubles for the transportation of 150 casaks' families belonging to the Transbaikal militia, in the region of the Oussouri Railroad. This last measure was proposed by the Minister of War, in order to protect the Oussouri Railroad against the Chinese robbers and highwaymen.

In all, the length of the track laid on the Siberian Railroad is now 1,012 miles, which is less than one-quarter and more than one-fifth of the whole length of the Siberian main line (4,550 miles.)

The twenty-first session of the Committee of the Siberian Railroad of January 4, 1895, presided over by Emperor Nicolas, was very interesting.

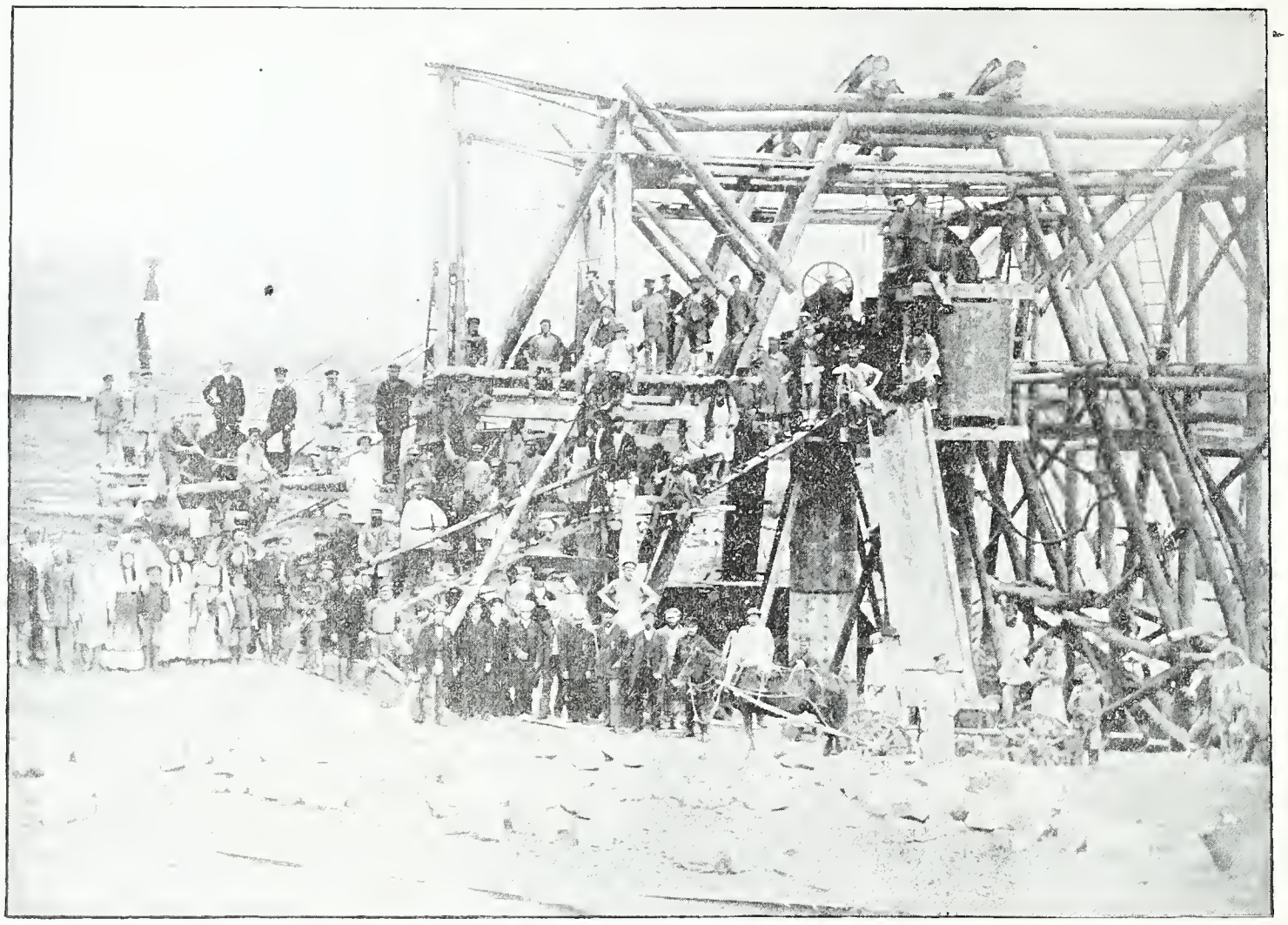
In the paper presented by the Minister of War it was stated that in 1894 great topographic surveys were made. Five parties of military topographic engineers surveyed about 15,000 miles in the region of Transbaikal Railroad and plotted it. Furthermore, the engineers of the Irkoutsk and Amour division have surveyed the region of the Baikal Loop Railroad and of the Amour Railroad. All of these topographic surveys were made principally for the sake of the better location of the railroad, and therefore in connection with the surveys of railroad engineers. In addition to these, the engineers have described the climate, population and agricultural possibilities of the country. The geographic situation of Verkne Oudinsk and Kaidalovsk has been determined astronomically, the longitude by means of telegraph, and 29 other points by means of chronometric expeditions.

This year (1895) the topographic surveys will be continued in five regions. The credit required for these topographic works will be 143,000 roubles (in 1895).

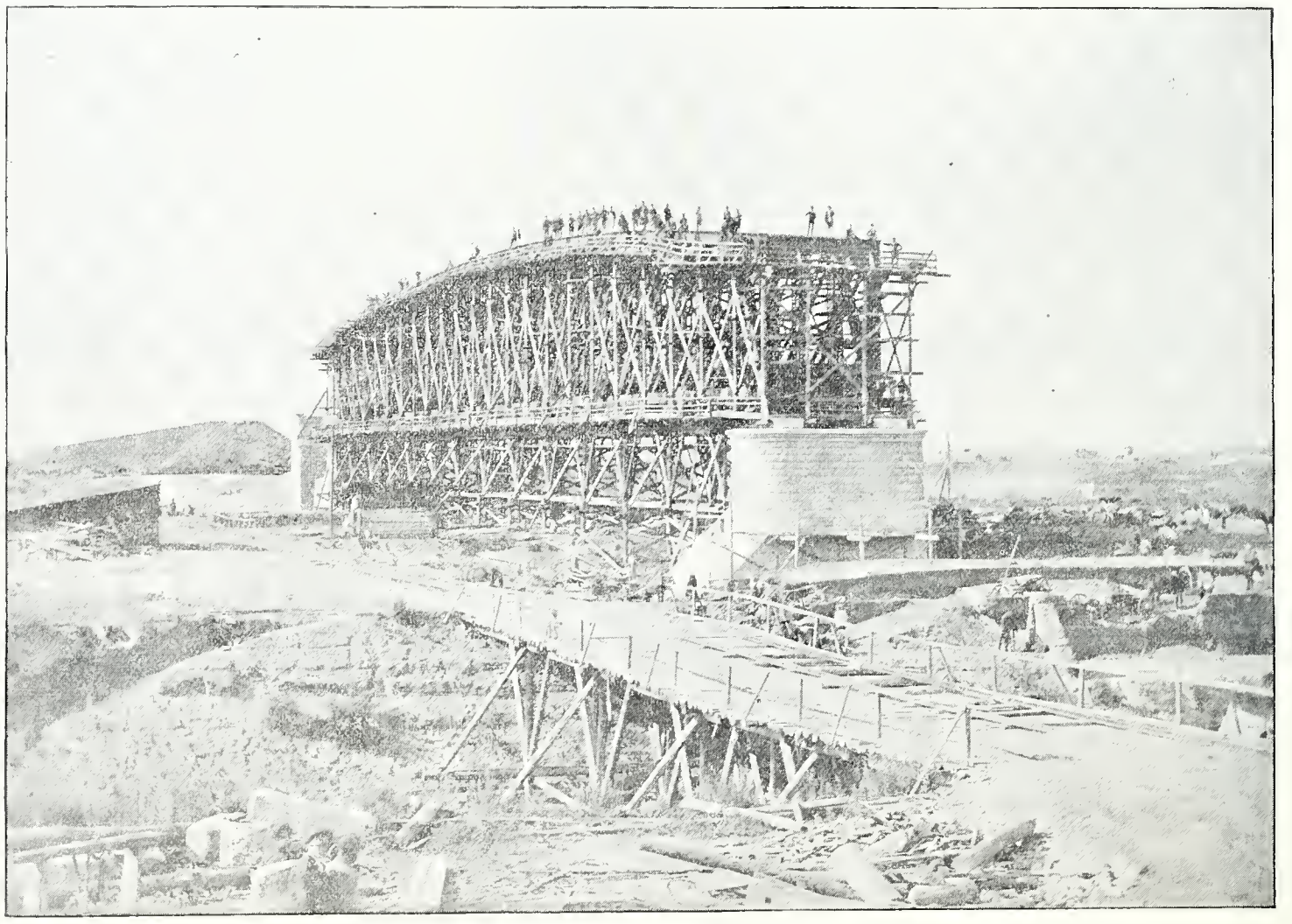
The Minister of Finance (Mr. S. Witte) has made a very important statement concerning the construction of the Amour Railroad. According to the latest information, the first division of the Amour Railroad, from Sretensk to Zeia River, is the most difficult. Therefore, and in order to hasten the completion of the Siberian main line, it is necessary to make the surveys and location of the second division eastward of Zeia, from Blagoveshchensk to Khabarovsk, at once, so that, when in 1896 the earthworks on the North Oussouri line are completed, the construction of the second division of the Amour Railroad (which is easier to construct) can be begun.

The Minister of Agriculture and State Properties (Ermoloff) presented an account of the geologic surveys of 1893 and 1894, and asked for 139,000 roubles for the same purpose in 1895. This sum was appropriated, with instructions that the geologic explorers shall chiefly search for coal which can supply the mineral fuel for the Central Siberian and Western Siberian Railroads. During the geologic surveys of 1893 and 1894 the following useful minerals were discoved: 43 mines of lignite and coal, 15 placers of gold, 36 copper ore deposits, 10 iron ore deposits, 2 lead ore deposits, 2 deposits of graphite, 1 petroleum deposit, 2 manganese ore deposits, and 1 silver ore deposit. It is most important to find mineral fuel, which can be supplied to the Western Siberian and Central Siberian Railroads, and this will be the chief aim of the geologic surveys of 1895.

The whole length of Russian railroads is now 23,113 miles, of which 20,813 miles belong to the Government and are under the control of the Ministry of Ways of Communication, 899 miles under the Ministry of War, and 1,401 miles to the Finland Government.



CONSTRUCTION OF THE TOBOL BRIDGE, SINKING OF CAISSON, FALSEWORK, SLUICES AND TRANSPORTATION OF EARTH.



MOUNTING OF THE FIRST SPAN OF THE TOBOL BRIDGE IN KOURHAN, OF WHICH THERE ARE THREE SPANS OF 350 FT. EACH.

THE TOBOL BRIDGE ON THE GREAT SIBERIAN RAILROAD.

France, with a population of 39,000,000, has a fighting force of 2,715,470 men, able to appear in the field at a minute's warning.

SCIENCE FOR YOUNG PEOPLE.

Conducted by E. P. LEWIS.

Testa believes it possible that at some future day we may dispense with wires to convey electric currents, the electric energy being transmitted in waves through space, so that motors may be run without direct connection with a dynamo. Telegraphic signals have already been conveyed for considerable distances in this manner, and Professor Preece, of the British telegraphic service, is now trying to improve this method. Lately the cable connecting the island of Mull with the main land of Scotland broke down. An insulated line of wire about one mile long was put up on the coast parallel to a telegraph line on the island three or four miles distant. Every time the electric current passed along one wire it would send out electric waves through all the surrounding space, some of which would reach the parallel wire and induce currents in it which would produce sounds in a telephone placed in the circuit. The currents in the first line were furnished by an alternating current machine. In this way communication was kept up without interruption until the break in the cable was repaired.

* * *

The rough surface of ground glass and the frosted designs often seen on glassware are usually made by a sand blast. The sand is driven out of a small nozzle with great force by air pressure behind it, and the sharp edges of the grain dig into the glass. By protecting the surface of the latter, except where it is desired to destroy the polished surface, designs of any kind may rapidly be cut into it. The portions thus treated become almost opaque because the roughened surface scatters the light air all directions instead of allowing it to pass directly through. The same process has been employed in working metals and wood and even in engraving.

* * *

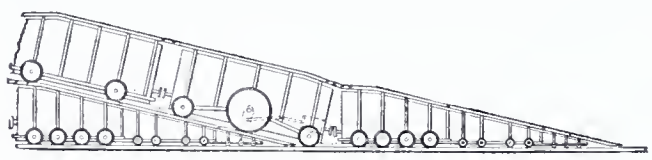
The intensity of a given light is found to vary inversely as the square of the distance from it—that is, at a distance of two feet from a candle the brightness of its light is only one-fourth that at one foot; at three feet, one-ninth, and so on. A very simple method of comparing the intensities of two lights, and a very good one, is this: Cut two pieces of clean paraffin into blocks about two inches square and one-half inch thick. Warm one until one-flat surface is melting, and lay it on a piece of paper of the same size as the block. Then soften one face of the other piece of paraffin in the same way, and lay it on the paper. The two blocks on cooling will be firmly stuck together with the paper between. If you now hold the block before a window the piece of paraffin nearest the light will appear much brighter than the other, the light being entirely diffused through the semi-transparent substance until stopped by the paper. Suppose you wish to compare a gas light with a candle. Hold the block between them, and move it between one or the other until the two sides are equally illuminated so that the dividing line disappears. When this is the case the intensity of light on the two sides is the same. Suppose the candle one foot away from the block, and the lamp four feet. Applying the law of inverse squares we would find the lamp equal to sixteen candle, since one-sixteenth of its intensity at one foot from it is equal to that of a candle one foot distant. This instrument is called a diffusion photometer.

* * *

Next to iron, nickel and cobalt, oxygen gas is the most magnetic substance known, its susceptibility to magnetisation being about one-three-thousandths part that of iron. When reduced to the liquid state by cold and pressure, its magnetic properties become much stronger than when in the gaseous state. Dewar has shown that when in the liquid state it will adhere strongly to the poles of a magnet.

Perpetual Motion Outdone.

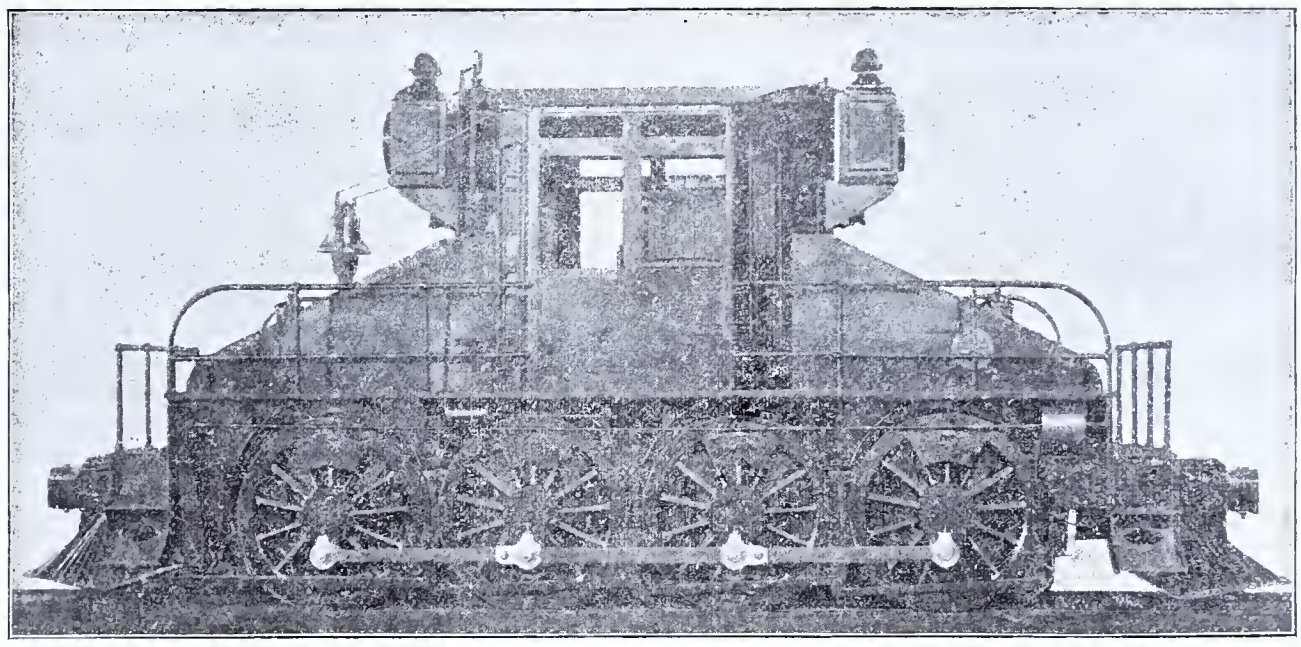
Applications for patents on some queer and ingenious ideas find their way into the U. S. Patent Office. In March last Mr. Henry L. Simmons, of Wickes, Montana, obtained a patent on a scheme that is intended to enable two trains to pass each



other at full speed on a single track. It is proposed to place on the front of each engine going in one direction an incline plane containing two tracks closely adjusted to the rails of the regular track. There are to be connected at the top of the engine with rails extending the whole length of the train and back to the main track again. What a simple scheme! When a train is met the engineer doesn't have to pay any attention to it, for the one without the inclined plane is expected to go right up and over the other and on about its business. Perpetual motion may have some merit and possibly the discovery of the principle would be of great value, but it could hardly excel the scheme of "over and under" lightning express trains.

A Sixty-Seven Ton Locomotive.

The Baldwin Locomotive Works recently turned out a 67-ton electric locomotive for experimental work in handling heavy freight and switching purposes. It is built after designs by Messrs. Sprague, Duncan & Hutchinson, of New York. The locomotive resembles somewhat the ordinary consolidation type used for heavy freight-yard work. There are four pairs of drivers coupled together by quarter-cranked connecting rods. The frame and the superstructure are symmetrical and the former is provided with frieght buffers and iron pilots. The pedestal boxes are a special form made of cast-steel and projeet inward, forming the brackets which carry the motors. The lower sides are arranged to be dropped out, so that the brasses can be readily replaced in the usual manner. These boxes are very large and heavy and perform the duty of carrying both the axles upon which the armatures are rigidly mounted and the field magnets concentric to them. A stirrup projects from the upper part of each to engage the middle section of inverted elliptical springs. There are four sets of springs arranged on the double three-point suspension system. In this way the whole superstructure is carried on



SPRAGUE SIXTY-SEVEN-TON ELECTRIC LOCOMOTIVE.

equalizing springs. The drivers are 56 inches in diameter, the ends only being flanged.

The motors, four in number, and alternating in position, are the "Continental" ironclad type, the field magnets, consisting of two steel castings, having two field coils placed at the ends of the motors, thus forming two consequent and two salient poles. The magnets are compound wound. The armatures, which were built by the Westinghouse Electric and Manufacturing Company, are of the slotted type. The motors are wound for 800 volts at 225 revolutions, which equal about 35 miles an hour when in multiple. About 250 amperes of current will be used, and, at 93 per cent efficiency, each motor will give about 250 horse-power. There will be a constant drawbar pull of over 10,000 pounds. To effect the prompt operation of the controlling system, compressed air from the air brake tanks is used. It is kept at a constant pressure by a special electric pump. The cab is provided with ammeters, voltmeters, whistle, bell, headlight, etc. The American driver brake is applied to every wheel. The cab, as seen from the illustration, is centrally mounted with wedge-shaped ends and forward-inclined sections running down to each end of the locomotive. The controlling apparatus in the cab is so arranged that the engineman sits at the right side looking forward, no matter which way he is normally running.

The total weight of the engine is about 134,000 pounds, equally distributed upon drivers.

For the data and illustration presented in the above article we are indebted to the "Railway Gazette," of New York.

THE decision of the Supreme Court declaring the Income Tax law unconstitutional necessitates the refunding of about $80,000 already paid on this account.

Report of Inventors and Maufacturers Assocation.

TO THE INVENTORS AND MANUFACTURERS OF THE UNITED STATES:

In a broad way, the interests of manufacturers and inventors, as regards patents, are the same, are coordinate. Manufactures are created by invention, which, in turn, is fostered by the manufacturing industries. The prosperity of the one must needs go hand in hand with the progress of the other.

These coordinate interests are of enormous magnitude, and dominate the progress of the world. It is therefore most fitting that those two numerous and influential classes of our people, whose greater interests run parallel, should join hands in one national association, and work together unselfishly for the benefit of all.

The American Association of Inventors and Manufacturers has been formed to promote these common interests by securing the active co-operation of inventors and manufacturers in the collection and dissemination of the best information and opinion on the development, protection and management of inventions and patent property.

For this purpose, the Association maintains a central office in the National Capital, in charge of an efficient secretary; and besides the regular officers has standing committees to whom are intrusted the more important subjects within the scope of the Association's work.

One of the more important of these committees is the Committee on Legislation, which looks after the numerous bills before Congress, appears before the Congressional committees whenever required, and, through reports and other papers, keeps the members advised of the progress of legislation. The importance of this work will be appreciated when it is remembered that no less than fifty-three bills relating to patents were before the last Congress, and that many of these bills are inimical to the rights of inventors and owners of patents, while some of them strike at the very root of the Patent System itself.

The Association publishes, and furnishes free to the members, valuable papers on subjects relating to the nature and protection of property in inventions and patents, and holds annual meetings for the presentation of papers and the consideration of questions relating to these and allied subjects.

It is confidently believed that in no other way can inventors and manufacturers so well serve their best interests as by becoming members of this Association and thus directly co-operating in the valuable work it is already doing.

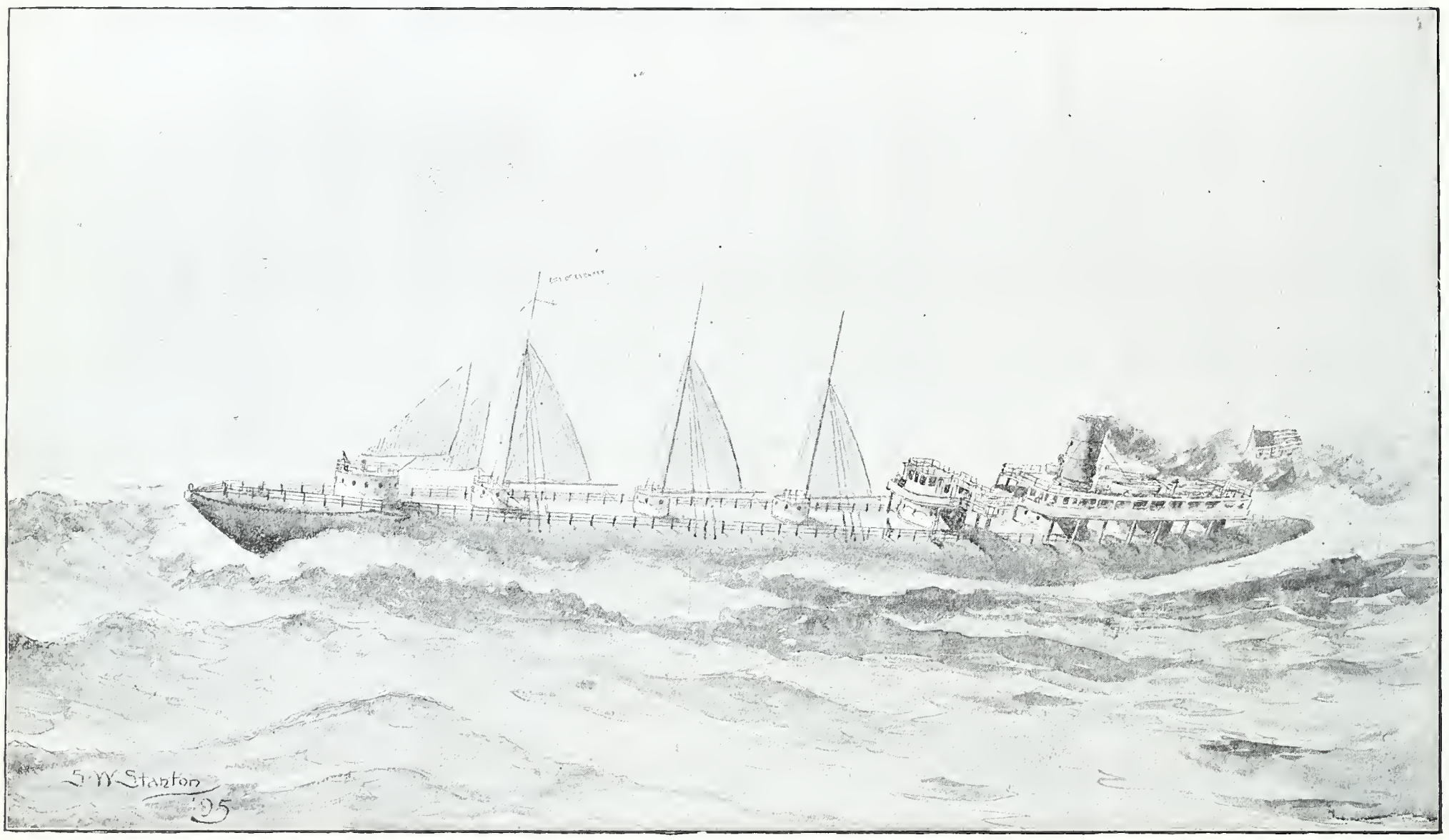
We, the undersigned, a committee appointed to present these claims of the Association to the Inventors and manufacturers of the United States, therefore ask your consideration of the same, and that you join with us in carrying on its work, by becoming a member of the Association. The membership costs only the nominal sum of five dollars per year, which sum, with the application for membership, may be sent directly to the Secretary and Treasurer, Geo. C. Maynard, No. 800 H St., N. W., Washington, D. C.

FRANCIS H. RICHARDS
CHARLES E. BILLINGS
GEORGE OTIS DRAPER
LEWIS MILLER
JOHN C. CUSHMAN

HENRY C. PAYNE of Milwaukee and Geo. R. Sheldon of New York have been appointed receivers of the Milwaukee Street Railway Company.

A Whaleback for the Pacific Ocean.

The kind of steamer that seems to meet the requirements of economical freight traffic is the vessel shown in the cut (which is kindly loaned to us by *Seaboard*), and on account of its appearance been dubbed the "whaleback." The tests for seaworthiness of these vessels has been made and their staunch properties demonstrated by steaming across the Atlantic and around the Horn. They have been plying between ports on the great lakes for a year or two and proved a success. Recently the experiment was tried of building one on the Pacific coast and the steamer of which we show a picture, the City of Everett, was constructed under the eye of the original designer and builder of all the whalebacks, (about forty in number at present) at Everett, a new city on Puget Sound. This celebrated body of water is destined to be an important adjunct in building up the commerce of the great northwest, being of such depth and contour as to afford a multitude of fine harbors for all sizes of ships.



NEW WHALEBACK STEAMER BUILT FOR THE PACIFIC OCEAN TRADE.

The whaleback just completed is a very large one. She is 361 feet long and 42 feet broad. She can carry water ballast of 1,800 tons and her coal bunkers will contain 1,000 tons. The peculiar shape of this class of vessels is their most remarkable feature. It offers the least resistance to the force of the waves on account of the rounded sides. which enable the vessel to plow along without much diminution of speed in stormy weather. The speed expected of her when fully loaded and in moderately good weather is 12½ knots per hour. When running with water ballast a 15 knot gait can be easily reached. Contrary to all precedent in steamship building the machinery is placed at the stern, giving the entire forward and midship space for freight purposes. The turrets and masts serve as aids in loading and unloading, and it is claimed that cargoes can be easily and quickly handled in this way, the masts carrying sail amounting to 6,500 square feet. All the modern appliances for steaming are employed in this vessel; it has two steam capstans and is steered by steam. Everything liable to break is carried in duplicate. The lighting is by electricity. A few state-rooms are fitted up for passengers.

This whaleback, it is said, can carry freight cheaper and faster for long ocean voyages than any other steamship now afloat. The cost is not very great considering its superior efficiency—$300,000.

It is especially adapted to steam across the Pacific to the Oriental ports and to make long voyages. As the carrying trade between Asiatic countries and the Pacific slope is capable of vast development the advent of these ingenious boats is looked upon by those interested in our commercial aggrandizement as a potent factor, and the INVENTIVE AGE takes pleasure in heralding the introduction of this addition to the trans-Pacific fleets.

Evils Incident to Our Patent System.

The Electrical World, of April 20th, contains an excellent article on the evils incident to our present patent system, in which the writer, Mr. Talbot, points out some needed and just reforms that should be inaugurated. The World in commenting, says: "The conclusion to which one is forced by a consideration of the disadvantages under which the poor inventor labors is that patent law, as now administered, practically derives him of the fruit of his labors, instead of, as intended by its framers, securing him its enjoyment. It is not alone the poor inventor who suffers, for the course of recent patent litigation shows that, even with the most powerful financial support, the delays of law frequently act as a bar to the establishment of rights until a favorable decision becomes of mere historic value. Where the injustice is so manifest it would appear that a remedy should exist near at hand, but this does not seem to be the case. The monopoly conferred by a patent is so complete that it would be unjust to the public and to the claims of prior inventors to permit it to be established upon the almost necessarily incomplete examination of a patent office examiner or a perfunctory adjudication of a court. The monopoly is granted as a reward for a meritorious service to the public, but possession cannot be secured in the face of denials of the performance of the service until their falsity is proved. As we believe that none would care to place the absolute grant of such a complete monopoly into the hands of patent office examiners, litigation is a necessary evil, and efforts should be directed to mitigating its consequences. A step in the right direction would be the institution of patent courts presided over by judges scientifically competent to appreciate the technical points upon which they are called to deliver an opinion, for it is only rarely that patent cases can be rationally decided upon purely legal considerations, without reference to the technicalities involved and expert knowledge of the state of the art.

Thirty Thousand Feet Above Ground.

In December last Dr. A. Berson, the famous scientific aeronautist, made the highest balloon ascension ever made. He started from Stassfurt and travelled northwest over the Hartz mountains. He He reached the height of 9,150 meters (30,020 feet). He felt, with the means which he had for supporting life and resisting the cold, that he might go another thousand meters, but thought the risk of losing all by doing so to great, and therefore descended from that point. It was well that he did so, for on the descent he was seized with violent shivering in every limb, from the terribly starving and killing effect of the dreadful cold; and for a whole hour of his downward passage two of his fingers were frozen, and were only brought back to life by energetic friction. Dr. Berson was not only clothed in furs as warmly as possible, but for the last hour nearly of his ascent he drew his breath from the oxygen which he carried with him in bags. If for a few seconds he stopped drawing his breath from the oxygen bags, he was at once dizzy and dangerously weak; and even with his ample supply of oxygen, which he constantly breathed, and on which he constantly breathed, and on which he could keep at work, his eyes once closed in spite of himself, and he was perilously near letting go his support, and sharing the fate of the two Frenchman. The degree of cold at the final height reached was 53° below zero Fahrenheit. The time taken for the ascent, the voyage of more than 310 kilometers (194 miles), and the descent. was five hours and twenty minutes, and of this time the descent took three hours.

At Charlottenburg, near Berlin, Professor Assmann has experimented recently in sending a small balloon to a height beyond the limit at which life ceases to be possible. The automatic registering apparatus sent up in the balloon reports the figures indicated by the barometer thermometer at various heights. An experimental flight of eleven hours carried the balloon through a voyage of about 600 miles and to a heighth of 16,235 meters, or 546 feet over ten miles. At the height reached the thermometer registered nearly 60° below zero Fahrenheit.

THE great Edison incandescent lamp works are no longer turning out lamps with bamboo filaments. Bamboo has given way to paper as the basis of the delicate black filament that glows golden when the current passes through it.

Industrial Progress in the Arts.

[A paper read by A. V. Newton, at the Eighty-Second Ordinary Meeting of the Chartered Institute of Patent Agents, London, Nov. 14, 1894.]

The marvellous awakening, since the days of Watt and Arkwright, of the inventive faculty, and its effects, resulting in the enlargement of the sphere of British industries, affords, it is believed, a subject that should interest the members of the Institute, both socially and professionally.

It is however intended, in this paper, to examine the matter chiefly in relation to the professional duties or opportunities of the patent agent, who, in contemplating these, should raise his mental vision to a sufficient altitude to secure a wide horizon. The importance of this wide horizon to professional men is well urged by the late Lord Derby in a volume of his selected speeches, where he says: "All the hardest workers I have known in their business were men who had a very keen enjoyment of at least some one pursuit outside of their business." This idea he illustrates by reference to a statement of Mr. J. S. Mill. who, in one of his works, mentions incidentally certain persons "who, knowing nothing except political economy, necessarily know that but ill," and, said Derby, "I believe the generalization is a true one."

The commercial growth of Great Britain, and even the enterprising spirit of its inhabitants, is mainly due to the development of invention applied to the arts.

This development has been fostered, or at least we believe it to have been, by the action of the patent laws; hence we desire to see these laws made as beneficial as possible to inventors, both as respects the security of their brain creations, and the facility of defending their legal rights.

It would appear that no class of the community can be indifferent to this subject, for commercial revolutions have, for the last hundred years, and more particularly during the last half century, been in constant progress, both in improving old industries and in creating new ones.

Thus, to cite a few trite examples:

Within the author's remembrance the india-rubber manufacture has arisen, and now it is indispensable to all classes.

Aniline, unknown till the date of Perkins' patent (1856), now counts annually in the Patent List its hundreds of inventions for producing varieties of brilliant and pleasing dyes.

So, again, gun cotton is a comparatively new product, and it has, in a variety of ways, been employed in the arts as an ingredient of divers manufactures, one example of which threatens to change the science of war.

Aluminium, until lately a stranger to the Arts, although known to the analytical chemist, appears to have a destiny as an ingredient of alloys, the value of which it is impossible to estimate. These are a few familiar examples which illustrate the creation of new industries without displacing old ones, and due simply to the discovery either of new materials or the applications of old ones to the arts.

Another class of new manufactures is due to the utilization of natural laws undreamed of by our forefathers.

The most important of these are the expansive force of steam, and the explosion of mixed gases; the attractive force created by electricity in soft iron, and its disruptive force in the deposition of metallic and other substances; the action of vacuum in evaporation and in the temporary adhesion of contact surfaces; the action of electricity as a generator of light, heat and power and a transmitter of sound; the action of light upon sensitive films in the production of photographic images; the combined use of vacuum and the electric current in the production of the incandescent lamp; the combined use of photography with the deposition of metals for the production of printing surfaces.

All these discoveries have created new and important industries, almost, if not wholly, within our own time.

Of another kind are the inventions of Hargreaves, Arkwright and their successors, for producing, automatically, yarn and thread from cotton and other fibrous substances.

Later followed the introduction of the bobbin-net and other lace machinery, which, without displacing the industry of the pillow-lace artist, created a new branch of manufacture.

In like manner the improvements on the knitting frame, originated by W. Lee, of Cambridge, have created an extensive manufacture in the midland counties.

To this group of inventions belongs the Fourdrinier web paper machine, which produces the rolls of paper used by the daily and weekly journals in throwing off their hundreds of thousands of copies which go to supply the mental craving of the millions of readers of the present day.

The sewing machine, in its various forms, is another example in which the possibility of supply has created new demands.

This invention, which doubtless has been viewed as opposed to the true interests of the seamstress, tailor and shoemaker, by its gradual introduction, fortunately escaped the vicissitudes of Hargreaves' and Arkwright's spinning mechanism and Heathcote's lace machinery, the destruction of which was accomplished by the hands of those whose families were destined to be enriched by the labors of those famous inventors.

The scope of invention thus far indicated implies nothing less than a social revolution, or, to use the approved cant phrase, a social evolution; for whereas motive power a century ago meant only animal power, supplemented by the impelling force of wind and water in the limited areas in which these were available, we have now a motive power at command which can be multiplied *ad libitum*. The knowledge of such aid being at hand, the inventive faculty is not hampered by the consideration of physical sources available for carrying into successful operation objects theoretically practicable in mechanics.

But if the inventive faculty is, when put in action, such a revolutionizer as has been indicated, it behooves the political economist, as a well-wisher to humanity, to scrutinize and ponder over its effects on that class of the community specially affected by it.

Assistance in this direction is afforded by an able article in a recent number of the Edinburgh Review, entitled "The Economy of High Wages," being the review of a work by Mr. J. Schoenhof, bearing the like title.

Putting aside for the moment the important question of the rate of wages discussed by the reviewer, it will be well to consider to what extent the field of profitable industry has been enlarged by applied invention.

The most convincing example is afforded by yarn spinning, which, as a manual industry, was practically incapable of expansion.

The time is not so far distant when every spinster was a spinner. What does this mean? Primarily, dear clothing and little of it, there being of necessity such a limited production of woven fabrics as to call for the use of leather both for garments and wall coverings.

We are told that when handspun yarn was relied on by the weaver, he was constantly obliged to stop his loom and make a circuit of his district, to gather in all the yarn which had been spun since he last settled to his loom. At the present time it would not be difficult for Great Britain to supply with yarn and thread the demands of the whole world.

In support of this assertion may be cited a remark of the Edinburgh Reviewer, who states that "the consumption of raw cotton in England has increased threefold since 1850, and the value of exported goods has increased proportionately."

In "Ure's Dictionary of Arts" (1861 edition), it is stated, in comparing the primitive cotton wheel of India with the spinning mule, that by the aid of mechanical fingers one Englishman can turn off more yarn, and of finer quality, daily, than 200 spinners of Hindostan.

This statement will be readily credited when it is remembered that the mule is furnished with from 240 to 1,000 spindles, each of which spins a thread at a greater rate than the most practised hand spinner can work.

Again, the throstle furnished with a double set of spindles, from 70 to 150 in each set, and having a continuous spinning action, in place of the intermittent action of the mule, and consequently working at a far higher speed, plays a like part in the economy of manufacture, and makes it possible to produce the countless bales of woven fabrics that supply the home and foreign markets.

It is the common experience of every trade in which mechanism has been made to take the place of hand labor, that the speed of production may be increased simply by the improved make of the machinery and the increased aptitude of the attendant.

The following extract from Mr. Schoenhof's work gives his experience on this head: "I stated, in my report, that one silk-throwing mill in America had lately exchanged old machinery for new, by which change the speed had been increased from 5,000 to 7,500 revolutions a minute. Later on, I found mills in America that ran their machinery at 10,000 revolutions a minute, and one which ran at 12,000 or even 13,000 revolutions."

The tendency of machinery to cheapen manufactures is admitted on all hands, and the increased profits derived from manufactures by the use of machinery admittedly improve the condition of the country at large, but it is by no means the universal belief that as the wealth of the nation increases, the rate of wages increases also.

It would, however, be strange were it otherwise, for every new manufacture established draws off hands from other branches of trade, the effect being to raise the demand for labor.

As manufactures develop, a tendency is created to reduce the cost of production; a profitable industry always creating competition.

The mode adopted to cheapen production is not the reduction of wages; on the contrary, competition, while necessarily creating a greater demand for labor, tends to raise the scale of remuneration: but to meet this, invention is applied to assist the workman, and enable him to increase his output with greater ease to himself.

Many inventions of this class are to be found in the Patent records; and many more are known only to those who use the new and unpublished facilities provided in the workshops of the mechanical engineer.

The minute subdivision of labor affords facilities for the introduction of minor improvements of this class; and intelligent workmen are quick to appreciate the advantages thus afforded them to increase their weekly earnings; while at the same time the rate of the piece-work on which they are engaged is greatly reduced, and an economy of importance to the public (without loss to any individuals) is effected.

As the tendency of every material reduction in the selling price of any article in demand is to increase that demand, the importance to workmen of every applied improvement tending to that result cannot well be overrated; for by such means only can profitable occupation be found for our teeming millions.

A like result obtains when ingenuity is successful in economizing raw materials or utilizing waste or residual products.

Of the latter class, reference may be made to glycerine, once a substance of no value, but now in great demand, chiefly in the production of explosive compounds.

Again, the economy effected in the consumption of steam coal must have had a material effect upon our carrying trade.

To quote again from our Reviewer: "Thanks to the triple and quadruple expansion engines now used in steamships, a pound of coal will do the work of three pounds a few years back."

This is no slight inducement to steamship owners to embark in new trade ventures, which, by reducing the cost of freight, will encourage the import and export trade of the country.

In the sixteenth century, when the population of Great Britain was scarcely a tenth of that shown by our last census, poverty was rampant in the land, but although it is now, and must ever be present with us, it is kept within bounds, for we have it on the authority of Mr. Giffin, that there has been an almost continuous decrease in the proportion of paupers since 1855.*

It may be asked: What is the bearing of all this upon the members of this Institute?

The reply is, merely, that the *raison d'etre* of the Patent Agent is that his labors serve to stimulate the growth of profitable invention, inasmuch as they help, or should help, to encourage ingenious inventors, by securing to them, through the procuration of valid patent rights, a tangible and salable property; whereas, in the absence of valid legal claims, inventors would be discouraged from prosecuting their calling.

Thus, it is manifest that the Institute is practically concerned in social economics, and that it should, so far as its influence can reach, help forward the industrial progress of the empire.

It is easy to see how this progress may be retarded, if the patent agent's duties are not fulfilled when his services are called into requisition.

The following extract from the Times of March 9, 1894, where the writer is commenting on the present slackness of commercial enterprise, will show the pertinence of this remark: "One considerable group of failures consisted of companies formed to acquire patent rights, which proved practically valueless. . . Many of the patents proved unworkable, the subscribers having apparently taken no pains to ascertain the nature of the inventions before risking their money."

Here is evidence from an unimpeachable source, that the services of the patent agent are either ignored, or that, being called in, incompetence, or something worse, had been brought into requisition.

The prevailing belief is, that the services of the patent agent are designed to render the more secure the property in inventions which the law confers on its authors. That being so, in proportion as this object is attained, will inventors and capitalists be encouraged to embark in new enterprises; and, on the contrary, as failures to protect the inventors' claims are evidenced, so will the diminution of healthy speculation, tending to the encouragement of our national industry, result.

But resort is not only had to the patent agent for the exercise of his legal acquirements. He is often required to supplement these by resolving questions of a social or politico-economical nature.

Now, it is not merely by the exercise of common honesty or simple-mindedness that the required

* B. Kidd, "Social Evolution," p. 222.

supplementary help to the inventor, or his patron, can be afforded, for although the deluded client may, with all sincerity, confess, in the words of the old ballad, "That with honest intention you first took me in," his adviser will obtain small comfort from such an admission.

Before, however, the patent agent applies himself to the question of securing a valid patent in respect to novelty of invention and sufficiency of specification, he may often be required to examine into the nature of the invention, as respects its utility and the chances of its yielding a profit to investors. The patent agent must by no means ignore this branch of the inquiry, or he will fail to bear his share of the work of advancing the material progress of the nation.

It may be urged that he is not an expert, and that it is not his duty to advise on trade matters. But what are the expectations of clients on this head? A client will not infrequently ask, supposing the invention to be new: How can I profit by it? Could a purchaser be found, and what price should be asked? Or must it be worked on a royalty or otherwise, and on what terms?

Now there are some inventions which, though most useful, would be utterly unsalable as such, and would be profitable only to the inventor as a manufacturer or user of the invention.

Again, there are inventions that, if patented, could only remunerate the patentee through the sale of licences for their use, while others would be of no value in the inventor's hands, but might fetch a price if judiciously introduced to persons capable of protecting their acquired rights.

Is it beyond the capacity of the experienced Patent Agent to offer material advice under those circumstances?

It should be remembered that one great success in the disposal or working of a patent begets much new and profitable business, not merely to the manufacturer and merchant, but also to the Patent Agent.

Thus, coincident with the advanced prosperity of our national industries, is that of our profession, which profits directly or indirectly by every successful patented invention destined to promote a new industry or enlarge the scope of an old one.

But it is not to an increase of pecuniary advantages that our attention should be limited. Our business is to create for our profession, which has had but six years' legislative acknowledgment, a position akin to that of the long established learned professions. If we look, for example, to that of the solicitor, we shall find that it is not merely legal knowledge which has secured to that profession the high consideration in which it is held, and the same remark applies to that of the physician; it is the advice which the family lawyer and family doctor are called upon to give, irrespective of law or medicine, that brings them into touch with their clients in a way that secures them high social recognition. That time has been an important element in the creation of this status there is no doubt, and the sooner, therefore, we recognize the fact and utilize it, the sooner will our profession take the rank in public estimation which it is destined to hold.

We are now called upon to perform, occasionally, duties bearing rather on political economy than legal practice, the proof of which is implied in the fact that, under the law of 1883, compulsory licenses may be enforced. A patentee, therefore, on receiving an application for a license which he is loth to comply with, naturally consults his Patent Agent as to the course to be pursued, whether in resisting the demand, or in offering terms that might find acceptance by the applicant or by the Board of Trade.

A chapter devoted to this subject in the author's work, "Patent Law and Practice," sufficiently indicates the intimate relation between Patent business and that phase of political economy which relates to barter.

The growing tendency to work patents of a certain class by means of a small syndicate creates opportunities for the Patent Agent to advise as to the prospect of pecuniary success, and as every success registered tends, as above indicated, to beget other ventures of a like kind, the demand for the appreciated services of the Patent Agent must increase.

That this is a matter of no little importance to the profession will be admitted when it is remembered that many profitable fields for the inventor have already closed or are on the point of closing.

For example, velocipedes, which have for the last twenty-five years furnished inventors with opportunities for the profitable exercise of their faculties, are now approaching perfection, and that subject must, like the once profitable subjects, lace machinery and power looms, cease to occupy a prominent place in the patent lists.

The various implements connected with agriculture having, by the accumulated labors of inventors, reached a reasonable stage of efficiency, now seldom figure in the patent records, and sewing machines have long since passed their zenith.

It may be said that it is not in the power, nor is it the province, of the Patent Agent to open up "fresh fields and pastures new" to inventors; but it is certainly within his power to check the ardor of both inventor and capitalist who would, in striving to benefit themselves, unconsciously open new sources of profit for the industrial community.

Let us glance at the opportunities offered to the reckless and incompetent Patent Agent for the exercise of his capacity for mischief.

These may be briefly stated thus:

1. Encouraging an inventor to patent what could not be secured by reason of defective subject matter.

2. Drafting an insufficient specification, in which the point of the invention was missed.

3. Imprudently advising a complainant in respect of infringement, involving a law-suit which ought never to have commenced, and the payment of ruinous costs attendant thereon.

4. Offering the counterpart of this advice to a defendant, leading to the resistance of a claim which ought to have been in the outset acknowledged.

5. Promoting a groundless claim for a license refused, or advising the refusal of a license claimed, when there is no reason for adopting either course.

These are a few of the occasions on which a Patent Agent may, by his ill-considered advice, deal a heavy blow and discouragement to industrial enterprize, and consequently to his own profession.

It must be obvious therefore, that legal and scientific knowledge combined will not suffice to equip the Patent Agent for grappling with the problems which social changes are daily bringing more clearly to the front.

These changes are confidently asserted by the Progressists as true progress, and it is earnestly to be hoped that they are rightly named, but it is hard to believe that a plague of strikes, which the industrial world is now lamenting, has any connection with progress.

To the patent agent, and to the patent agent only, strikes are a source of income, for, as necessity is the mother of invention, so the strikes of workmen create the stimulus needed to supersede handiwork by some new mechanical device.

If would be a useful feature if, on the Patent Records, those inventions were indicated which had their origin in strikes.

Examples will occur to many minds, and it will suffice to mention here but one, viz.: the riveting machine of Sir William Fairburn, used in riveting the plates of the great tubular bridge of Stephenson.

Attempts are now being made to create Boards of Conciliation, that the disputes between masters and men, fraught with such mischief to the community, may be nipped in the bud; but no satisfactory board has yet been formed, for the simple reason that the opposed parties, perfectly familiar with their own side of the case, can find no one to lead them to a proper understanding of their opponents' case. A legal chairman is considered best suited for the duty; but is it not necessary that, besides possessing a cool and unbiassed judgment, the chairman of the Board should command a general knowledge of the mechanical arts and the possible uses to which invention might be applied, to meet the wants of masters and to check the extravagant demands of workmen? If that be so (for pertinent and convincing arguments might suggest themselves to such a man), where better should such assistance be sought than amongst our own profession? It has been urged at the meetings of the Institute, that a more satisfactory solution of questions arising on infringement of patents, now settled with great cost in the law courts, might be arrived at by arbitrators selected from the roll of patent agents.

This, however, may have been a premature suggestion, as the profession has yet to make its mark before public opinion will bow to its judgment; but inasmuch as Conciliation and Law are not synonymous terms, there would seem to be an opening on Conciliation Boards for the employment of the patent agent's special qualifications, without challenging the opinion of the public on his competency to adjudicate single handed on abstruse points of law that frequently arise during the hearing of patent suits.

It has been said that the patent agent is the interpreter of patent law to the courts, and many illustrations of this might be discovered in the evidence given by experts in the earlier half of the present century; but the time has passed for the judges to accept such guidance, and it is for the patent agent now to accept implicitly the ruling of the courts.

It does not, however, follow that competent arbitrators should not be found on the roll of patent agents; considering the opportunities which are, at least, afforded them of imbibing the rules and practice of the courts in patent litigation.

A most hopeful prospect for the Boards of Conciliation is to be found in the admirably reasoned essay of Mr. Benjamin Kidd, "Social Evolution," where, speaking of progress, and the rise of what he terms the "new democracy," he says: "Great as has been the progress in outward forms, the more important difference lies far deeper. The gradual emancipation of the people, and their rise to supreme power, has been, in our case, the product of a slow ethical development, in which character has been profoundly influenced, and in which conceptions of equity and of responsibility to each other have obtained a hold on the general mind hitherto unparalleled."

Again, the writer, referring to our political seers, says: "They do not perceive that his (the new Demo's) arrival is the crowning result of an ethical movement in which qualities and attributes which we have been all taught to regard as the very highest of which human nature is capable, find the completest expression they have ever reached in the history of the race."

Whether the sanguine belief of Mr. Kidd is to be early realized or not, it is important to the security of a healthy industrial progress that a fusion of the interests of classes shall take place.

Opportunities are frequently afforded to the patent agent to further this movement when discussing between capitalist and inventor the terms on which they shall join interests. Whenever an agreement having justice as its basis is satisfactorily carried out, a leader among working men in the person of a successful inventor and patentee will have been gained over as a supporter of the capitalist class, and that by a bond which is not to be severed by political or trade agitators.

At the same time proof will be afforded that merit has gained its legitimate pecuniary reward, and the sting of the malevolent traducers of capital will be drawn.

Difficult as it may be to convince the working man that the advantages which he is seeking, by strikes, to secure in the shape of increased pay and shorter working hours, are in great part illusory, it is, perhaps, still more difficult to satisfy masters that they may be gainers by concession in both directions; yet evidence is not wanting which points to this conclusion. In the article, "Economy of High Wages," more than once referred to, the writer makes the following important statement: "A German commission appointed in 1879 to investigate more particularly the depression in the iron trade industry of that country, stated that the rise in wages, in their judgment, had been accompanied by a decrease in the number of workmen employed, but there was no falling-off in the amount of the product, and they reached the general conclusion that any rise in wages which is justified by the circumstances, raises the efficiency and the *morale* of the wage-earners."

Opportunities for advancing arguments of this kind to the notice of capitalists with a view of furthering industrial progress in the arts will not frequently occur to members of our profession, but it is open to all at least to join in the spirit of that famous prayer put by the poet into the mouth of Festus:

> Grant us, All-maintaining Sire!
> That all the great mechanic aids to toil
> Man's skill hath formed, found, rendered—whether used
> In multiplying works of mind, or aught
> To obviate the thousand wants of life,
> May much avail to human welfare now,
> And in all ages, henceforth and for ever.
> Let their effect be, Lord, to lighten labor,
> And give more room to mind, and leave the poor
> Some time for self improvement!

It is predicted that the new pneumatic horse collar will soon be universally adopted. With its use chafing is impossible.

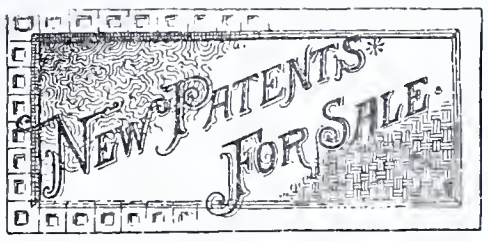
According to Printers Ink there are 228 more newspapers published in the United States and two less in Canada than there were one year ago.

W. D. Dale, of Dunsmuir, Cal., has invented a revolving locomotive headlight that will turn on curves. He attaches his gearing to the front trucks and as they turn on the track the headlight turns.

A Columbus, Indiana, man has invented an electrical means of sounding all the steam whistles in a city, or in the whole United States for that matter, simultaneously. The object is to have uniformity in hours of labor.

Caledoli's type setting machine, actuated by electricity, is described by "L'Illustration," of Paris, as likely to work a revolution in printing. Its capacity, when manipulated by an experienced operator, is said to be 50,000 ems an hour, which is several times the speed of any present machine.

A. S. Kratz, of Springfield, Ohio, is the inventor of an electric gun. In a recent trial of the gun, which is a brass tube of about 50 caliber, the bullets were fired against an iron plate and there was no noise of the discharge. The gun was fired as fast as missiles could be put in the breech, the projecting power being electricity.



Advertisements inserted in this column for 20 cents a line (about 7 words) each insertion. Every new subscriber sending $1.00 to THE INVENTIVE AGE will be entitled to the AGE one year and to five lines three times FREE. Additional lines or insertions at regular rates.

FOR SALE.—Patent No. 512,629. Rocking Churn. I have sold the right to three western states for $7,000; will take $5,000 for remainder of U. S. Large profit for manufacturers. For full particulars, address, Col. G. H. Smith, Webster, W. Va. 6-8

FOR SALE.—I, the undersigned, will receive bids on my Law-file Guide, [Pat. No. 537,827, issued April 23, 1895.] until June 15, 1895, when they will be opened and awarded to the highest bidder. Respectfully, Aug. Kaempfler 1316 Center St., Sheboygan, Wis. 5-7

FOR SALE.—Patent issued April 30th, 1895; a regular gold mine for somebody. It is a flax thresher and can be attached to a common harvester; it will thresh and clean the the flax at the same time as cut, with one operation. It has been tested and is a complete success. Will sell or let it be manufactured on royalty. For full particulars, address, T. O. Helgerson, Volga, South Dakota. 6-8

FOR SALE.—Patent No. 535,337; Rotary Engine; issued March 5, 1895. Simple in construction and mode of working. Inexpensive to manufacture. Correspondence solicited. Address, Joseph West, Galveston, Texas. 5-7

FOR SALE.—Patent No. 236,653; Non-defacing Shade Roller Bracket; no screws, no nails, quickly fastened. $5,000 or make royalty offer. Also Canadian and English patents. Clinton W. Baker, 37 W. Sunbury St., Shamokin, Pa. 6-8

FOR SALE.—Patent No. 493,115; Time Lock. Will sell state rights or United States at reasonable prices. Lock can be applied to any common safe door. Locks for five minutes or for seven days. For any information address N. B. Reis, Lincoln, Kans. 4-7

FOR SALE.—Patent No. 492,016; Potato Digger and Screen combined. Will sell at a reasonable figure. Address, E. A. Hoffman, Del Norte, Col. 6-5

FOR SALE.—Something good—Mowing Machine Knife Bar. This bar is so arranged as to hold the knives and Pitman eye with one bolt. For particulars address Z. E. Wiseman, Vadis, Lewis Co., W. Va. 4-7

FOR SALE.—A valuable patent on corn planting machinery, No. 527,160. Fits nearly all planters. Splendid to work by agents. Will sell or place on royalty with bonus. Address quickly, Leroy Runyan, Iola, Kans. 4-7

FOR SALE.—My patent, No. 513,542, and also an additional patent allowed but not issued, "An improvement in Tinners Hand Shears or Snips." Will sell on reasonable terms. Address, Geo. H. Stockman, 3510 N. 17th street, Philadelphia, Pa. 3-6

FOR SALE.—Patent No. 535,337; Rotary Engine; issued March 5, 1895. Simple in construction and mode of working. Inexpensive to manufacture. Correspondence solicited. Address, Joseph West, Galveston, Texas.

FOR SALE.—Or on royalty patent No. 532,151, Door Prop or Bolt. Holds the door open at any point and will bolt it when shut. Also best bosom board made. L. Funk, Waynesburg, Pa. 4-3

FOR SALE.—Or trade, patent No. 477,246, Washing Machine. Has stood practical use. Am not able to give it attention on account of poor health. A bonanza for right party. T. D. C., Box 43, Boyleston, Ind. 4-7

FOR SALE.—One-half interest of territorial rights of patent No. 432,592. A device for dressing or cutting mill stones. Address, Simon P. Bacaston, Sand Beach, Pa. 4-7

FOR SALE.—Patent No. 454,254, on toy belonging to the "puzzle" family. A fine opportunity for some person or novelty manufacturer. Only $200 and royalty if taken at once. Max Cohn, 828 Vliet St., Milwaukee, Wis.

FOR SALE.—Patent No. 525,225; Gravity Door Lock. Has no springs, Easy working, cheapest and most durable. Address, B. S. Miles, Gray Summit, Mo. 2-7

BUSINESS SPECIALS.

Advertisements under this heading 20 cents a line each insertion—seven words to the line. Parties desiring to purchase valuable patents or wanting to manufacture patented articles will find this a valuable advertising medium.

WANTED.—Manufacturers or capitalists who which to pay all expenses for an interest in the patent of a bicycle Motor to be patented. Address, Sam Taylor, P. O. Box 173, Houston, Tex. 6-6

WANTED.—Having invented several successful machines, I offer my services to anyone wishing to have an improvement made on any kind of machinery for a reasonable compensation, and if I fail I ask nothing. Address, Wm. E. Pleasants, La Junta, Col. 4-6

WANTED.—Some manufactures to make and sell my one process cider mill on royalty. Address, Wm. E. Pleasants, La Junta, Col. 4-6

WANTED.—Inventions of merit and in big demand to manufacture on royalty. Send model, specification, and state what you want on your invention. G. W. McCook, 720 Olive Street, St. Louis, Mo. 4-

WANTED.—Some articles to manufacture that will pay thirty per cent on the investment and will not require over five thousand dollars to put on the market. Address, S. Z. Starr, Drawer U, Indianapolis, Ind. 4-7

WANTED.—An agency to purchase or promote the interests of a good and meritorious invention. Address, with descriptive particulars, H. S. Hampton, Box 223, Lima, O. 3-5

WANTED.—To hear from parties with capital, interested in developing a valuable invention of merit. For further particulars address George C. Stanton, New Iberia, La. 5tf

WANTED.—An experienced salesman to sell my new patent. A preventative against train or bank robbery. For particulars, address, Silas E. White, Watertown, N. Y. 2-5

WANTED.—Manufacturers or capitalist who wish to pay all expenses for an interest in the patent for a meritorious invention to be patented. Address, George C. Stanton, New Iberia, La. Correspondence solicited. 3tf

WANTED.—To manufacture on royalty, household inventions. Send specifications and if models are sent prepay all charges. Galpin & Hanley, Binghamton, N. Y.

WE BUY job lots of patented articles for cost. We can sell anything. No commission business wanted, but if you have a stock to sell, write to us. Industrial Publishing Co., Owensboro, Ky. 6-6

R. U. asleep? Listen! We'll pay U $5 for every new student, who pays entire tuition in advance, Milwaukee Correspondence School of Practical Bookkeeping, 828 Vliet St., Milwaukee, Wis. (13 years practical experience.)

Electric.

Five cent telegrams are to be tried in Italy.

Lancaster, O., will soon have telephone connection with the principal cities.

Japan in 1893 contained 11 electric light companies, in which $2,487,250 was invested.

A stroke of lightning recently burned out 100 lines in the telephone exchange at Little Rock, Ark.

The American Bell Telephone officials are said to be confident of a reversal of the decision which declared the Berliner transmitter patent void. The case may go to the U. S. Supreme Court.

Electric lights will probably soon be authorized in the churches of Rome for illuminating purposes, though wax candles and oil lamps must be retained for the use of the altars and shrines.

In 1887 there were but 13 electric roads with scarcely 100 cars. Now there are 850 electric lines, operating over 9,000 miles of track and 23,000 cars and representing an investment of over $400,000,000.

An electric line between Lorain, O., and Cleveland is soon to be built. It is expected to be the fastest electric line yet built, the calculation being to cover the 24 miles in a little more than half an hour.

The directors of the Edison Electric Illuminating Co., of New York have decided to authorize the issue of $16,000,000 100-year 5 per cent gold consolidated mortgage bonds for the purpose of extending the business of the company in the upper part of the city.

The engineer's estimates show that the Washington-Baltimore electric line will cost about $1,000,000 complete, including power houses at Washington, Laurel, and Baltimore, and track laid with eighty-pound steel rails, on hard-wood ties and rock ballasted. The overhead trolley system will be used. Work has already begun on the first five miles from Baltimore, for which contracts have been let; also on the power house of the Baltimore division.

The Star Spangled Banner's Author.

Many interesting things about Francis Scott Key—the author of the Star Spangled Banner—are contained in a pamphlet, which may be obtained *free*, from the Key Monument Association, of Frederick City, Maryland, by sending one 2-cent stamp for postage. This Association is raising funds for a suitable monument to the poet, and they suggest that in the schools and everywhere, upon or before Flag Day (June 14), this subject be suitable recognized. Contributions, however small, are asked for. Every one who loves the flag ought to have some small share in building this monument. The Governor of Maryland has strongly indorsed the movement. The names of all contributors will be preserved in the crypt of the monument, and published (without amount) in the history of the monument when completed.

THE Crown Fountain Pen, a standard article received the highest awards at the World's Fair. It is always ready, clean, simple and economical. Can carry in vest pocket like a lead pencil. Best hard rubber holder, gold top feed and 14k gold pen. Retail price $2.75. We will send the THE INVENTIVE AGE one year free, in lieu of other premiums to each purchaser of one of these pens.

Aftermath.

INCREASED European travel is indicative of an improvemeni in the times.

AMERICAN railroad bonds are again sought for in European money centers.

ARRANGEMENTS have been made for formally opening the new Harlem Ship Canal on June 17.

IT is said the French propose to spend over $20,000,000 on the Paris Exposition of 1900. It will cover over 2,000 acres.

THE Otis Steel Co., of Cleveland passed into the hands of receivers May 9th. Over 85 per cent of the stock is held in England.

THE United States Navy will be represented at the Kiel celebration this month by the crusiers "New York," "Columbia," "San Francisco" and "Marblehead."

THE United States Circuit Court of Appeals, at Boston, on May 18, handed down a decision in the Bell-Berliner telephone case, affirming the validity of the Berliner patent.

THE Paxton Rolling Mill, at Harrisburg, Pa., recently rolled a plate 124 inches by 25 ft. ⅝ inch thick. They are now at work on the stern plate for the American steamship "St. Louis," which will require a plate 120 inches by 128 ft. and 1¼ inches thich.

SECRETARY Rankine of the Cataract Construction Company states that no power will be delivered until the second dynamo is set up and ready for operation. This seems to mean that notwithstanding the fact that the first dynamo is now ready no power will be delivered even to local consumers, until perhaps August first.

MR. John Jarrett recently stated that there are now in this country, completed and in course of construction, 54 tinplate works. The capacity of these works will exceed an annual production of 260,000 tons of finished product, and will furnish employment to 11,000 or 12,000 hands. The capital invested is about $8,500,000, and the wages paid will be about $7,000,000 a year.

THE Dodge Manufacturing Co., of Mishawaka, Indiana, reports excellent business; they are working a full force of men on full time and continue to work quite a night force as they have been doing during the past winter. They have lately secured several very large contracts and like other large manufacturers feel the improvement in times, and look for a general but gradual bettering. Among others is a contract for a complete power transmission outfit for the Ocean Grove Electric Light Plant, Ocean Grove, N. J., and the Birmingham Electric Light Plant, Birmingham, Ala, They report the outlook "Excellent."

A New York daily paper recently published a list of 230 establishments, employing about 128,000 people, in which wages had been recently advanced, and since that list was published there has been an advance in all the establishments comprised in the Carnegie iron and steel plants in and around Pittsburgh, this advance alone affecting about 15,000 employes. Very few of these advances have been otherwise than voluntary and upon the understanding that the business conditions warrant them, the Carnegie advance being made voluntarily in the face of an existing agreement which would have kept wages down for the balance of the year.

Great Opportunity to Make Money!

I have had such splendid success that I can't help writing to you about it. I have not made less than $5, and some days from $15 to $25. I am really elated, and can't see why others do not go into the Dish Washer business at once. I have not canvassed any; sell all my washers at home. They give such good satisfaction that everyone sold, helps to sell many others. I believe in a year I can make a profit of Three Thousand Dollars, and attend to my regular business besides. When a Climax Dish Washer can be bought for $5, every family wants one, and it is very easy selling what everyone wants to buy. For particulars, address The Climax Mfg. Co., Columbus, Ohio. I think any lady or gentleman, anywhere, can make from $5 to $10 a day. I would like to have your readers try this business, and let us know through your columns how they succeed.

THE daily record of an engine's performance is of great value to the engineer, affording him an opportunity to at all times observe and determine the condition of his machinery. Howard Challen, of New York, is the publisher of a inexpensive but very complete Engineer's Log Book, ruled and printed across two pages, giving the month, day of week, average pressure per gauge, hours run, revolutions, vacuum per gauge, piston speed (feet per minute), indicated horse power, initial pressure per indicator, terminal pressure, water per H. P. (lbs), fuel burned, ashes and waste, oil and waste used, etc. Memorandum space is also left for record of repairs, defects, etc, For sale by Bretano, Washington.

"BUBIER'S POPULAR ELECTRICIAN" is the name of a monthly publication which contains a vast amount of valuable information on all electrical subjects. Its department of "Questions and Answers" will be appreciated by students and amateurs desiring information or instruction on any problem that may arise. THE INVENTIVE AGE has made special arrangement whereby we can supply that popular dollar journal and THE INVENTIVE AGE—both publications one year—for $1.50.

"Tips to Inventors."

This is one of the most instructive and useful works for mechanics and inventors. Its author is Robert Grimshaw, M. E., and the book, cloth bound, retails for $1. THE INVENTIVE AGE for one year and "Tips to Inventors" will be sent to any address for $1.50

INVENTIVE AGE BUILDING.

PREMIUMS TO SUBSCRIBERS.

Read the following offers to new subscribers:

OUR $1 OFFER.

THE INVENTIVE AGE one year and two copies of any patent desired, or one copy of any two patents..... $1 00

THE INVENTIVE AGE one year and a list of 50 firms who manufacture and sell patented articles..... 1 00

THE INVENTIVE AGE one year and Altograph map of the City of Washington 1 00

THE INVENTIVE AGE one year and a five line (35 words), advertisement in our "Patents For Sale," or "Want" column, three times..... 1 00

For $1.

THE INVENTIVE AGE and any one of the following Scientific books:

How to Make Electric Batteries at Home, fully illustrated, by Edward Trevert.

Everybody's Handbook of Electricity, illustrated, by Trevert.

How to Make a Dynamo, by Trevert.

Practical Directions for Electric Bell Fitting and Electric Gas Lighting, by Trevert.

Elihu Thompson's What is Electricity?

OUR $1.35 OFFER.

THE INVENTIVE AGE one year and Joseph Allen Minturn's famous book "The Inventor's Friend," indorsed by such high authorities, as Dr. Gatling, Clem Studebaker and others.....$1.35
Book alone 50 cents.

THE INVENTIVE AGE one year and any one of the popular and instructive books as per offer in another column, under heading of "Popular Scientific Books."..... $1.35

THE INVENTIVE AGE one year and any one of the "Excelsior Edition of Standard Poets," mentioned elsewhere in this magazine..... $1.35

THE INVENTIVE AGE one year and a copy of "Picturesque Washington," 260 pp., 136 illustrations, Stilson Hutchins' famous book, former price $2, sent to any address in the United States..... $1 35

THE INVENTIVE AGE one year and The Peoples' Atlas of the World, one of greatest bargains ever heard of; size of Atlas 14 x 22 open; latest maps and statistics; handsomely illustrated, a $2 book with AGE one year—both for.... $1 35

☞ See another column for other offers.

OUR $1.50 OFFER.

THE INVENTIVE AGE one year and Robt. Grimshaw's famous book "Tips to Inventors"..... $1 50

Address all communications to
THE INVENTIVE AGE,
Washington, D. C.

Cantwell & Company, Patent Agents, Calcutta, Ind.

We have received from this well-known and long established firm in the east their handy little phamphlet which deals fully with the laws and regulations appertaining to the taking out of Patents and registering of Trade Marks in India and other Eastern countries. It will be found a very useful adjunct to the file of Patent Agents in this country and more so to those in this city, the headquarters of the fraternity. The manual contains a list of charges which we think are very moderate, and, which will we feel sure fill a long felt want in that direction.

A junior member and representative of the firm, Mr. Harry Cantwell, is at present in this city which he proposes to make a permanent residence.

All communications to him with reference to any information regarding Patent Practice in the East may be directed to care of the Inventive Age office, Washington.

THE INVENTIVE AGE can recommend the "Climax" watch, advertised in another column, as being, undoubtedly, the best stem-winder watch for the price in the market. It is a good time keeper, and either a plain or imitation engraved cases can be had. This watch is fully timed and regulated and fully guaranteed for one year, the same as Waltham or Elgin.

SUPPLEMENT.--Tips to Inventors.

The Infancy of Invention.

As capital is constantly being invested and expended to protect and preserve capital previously expended and invested in various enterprises all over the land, so will inventions continue—their variety and multiplicity being demanded to further the usefulness and perfection of inventions previously originated.

It was Edison who, replying to the question, "Do you think that the inventions of the next fifty years will be equal to those of the last?" said: "I see no reason why they should not. It seems to me that we are at the beginning of inventions." The truth of this prediction is illustrated in the many useful and wonderful achievements of Mr. Edison's own laboratory since giving utterance to this statement only a short time ago.

Profits from Invention.

The value of an invention is determined by no fixed rule. Fabulous sums have been made from simple and novel, as well as complex and useful, inventions. It is a fact that four-fifths of the business of the United States is transacted by the use of inventions. The benefits to mankind because of inventions, are so manifest and so common we are apt to look upon them in a matter-of-fact sort of way and fail to give the inventor the credit due him. In the majority of cases, however, the failure of an inventor to reap a reward is attributable to his own negligence, lack of forethought and indiscretion.

Nearly every human being is an inventor, but only a few obtain a *monopoly*—a patent—on the product of their brain. There are thousands of really useful articles, appliances and discoveries, in use every day by millions in all walks of life, that might have been patented had the inventor possessed the business sagacity that has actuated his more fortunate neighbor. Take for instance the open slot necessarily used in all conduit electric, or cable street railway systems. The inventor failed to get a patent on the idea and a fortune missed him.

There is money in inventions, but not always for the inventor.

The only way to make money out of an invention is through the protection afforded by a patent; not a patent in name only, but a *good patent*—one that is intelligently drawn, with claims commensurate with the scope and importance of the invention.

The profits arising from inventions in the electric field during the past twelve years have been simply astounding. In railway appliances, bicycles, typewriters, telephones, cash registers, slot machines and farm machinery, the field has been equally remunerative. And just think of that simple toy "Pigs in the Clover"—it netted the inventor, whose friends laughed at him for obtaining a patent on so simple a toy, over $150,000. The inventor of the metal plates to be attached to the worn heels of shoes (for sale in all cities) realized a fortune out of it amounting, it is said, to nearly $1,000,000. Perforated wooden seats for chairs and rubber tips for lead pencils brought the inventors big results. Howe made a million dollars from his sewing machine attachments, and the inventor of that simple lamp attachment, the inverted glass bell, to be suspended over lamps to protect the ceilings from being blackened, made the inventor rich. The "Darning Weaver," a device for repairing stockings, is a useful invention and is netting the inventor a handsome revenue on royalties. The wire nail and gimlet-pointed screw are fortune makers, and wire nails caused the invention of automatic machinery that manufacturers them so cheaply it does not now pay the carpenter to spend his time in picking a nail up when it drops, if it requires ten seconds to do so. The inventor of the well-known "safety pin" lived in luxury all his life, after discovering a means of concealing the point of a pin in such manner as to prevent scratching. The inventor of roller skates made nearly a million and the inventor of the needle-threader for a long time made $10,000 a year.

Relation of Capital to Invention.

Mr. Edward P. Thompson, one of the most entertaining writers on the subject of invention, says that "every invention, before the introduction into practical use, passes through two stages; namely, mental and physical"—mental when in the mind of the inventor only, and physical when the mental invention is put into bodily form by hand, or by hand with the assistance of a convenient tool. "A mental invention," says the writer, "sometimes does not become a physical invention because the inventor lacks money, technical knowledge or diligence. Such a mental invention often becomes a physical invention by the assistance of a capitalist, an educated person, or diligent companion." This being true the *mental* inventor, the person who, for lack of means possibly, would fail to make his invention a physical reality—such a person should take into his confidence a friend or companion to share the prospective benefits of his invention. Thousands of meritorious mental inventions are never worked out because of the over-timidity of the inventor, his exagerated greed for *all* the benefits to accrue instead of half the loaf, which in many instances is, or would have been, ample reward. Mr. Thompson truly says: "Inventors and capitalists should be more willing to co-operate. It is too often the case that the former must pay for his own experiments and all patent costs before a capitalist will even take the trouble to look into the merits of the alleged invention. On the other hand it is too often true that the capitalist seeks to join with the inventor, but the latter wants too high a price at the beginning."

Who Can Apply for Patents.

Patents are issued to any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or new and useful improvement thereof, not known or used by others in this country, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned; and by any person who, by his own industry, genius, efforts and expense has invented and produced any new and original design for a manufacture; any new and original design for the printing of fabrics; any new and original impression, ornament, pattern, print or picture to be printed, painted, cast, or otherwise placed on or marked into any article of manufacture, or any new, useful and original shape or configuration of any article of manufacture, the same not having been known or used by others before his invention or production thereof, nor patented or described in any printed publication, upon payment of the fees required by law and other due proceedings had.

If it appears that the inventor, at the time of making his application, believed himself to be the first inventor or discoverer, a patent will not be refused on account of the invention or discovery, or any part thereof, having been known or used in any foreign country before his invention or discovery thereof, if it had not been before patented or described in any printed publication.

Joint inventors are entitled to a joint patent; neither can claim one separately. Independent inventors of distinct and independent improvements in the same machine can not obtain a joint patent for their separate inventions; nor does the fact that one furnishes the capital and another makes the invention entitle them to make application as joint inventors, but in such case they may become joint patentees. The receipt of letters patent from a foreign government will not prevent the inventor from obtaining a patent in the United States, unless the invention shall have been introduced into public use in the United States more than two years prior to the application. But every patent granted for an invention which has been previously patented by the same inventor in a foreign country will be so limited as to expire at the same time with the foreign patent, or, if there be more than one, at the same time with the one having the shortest unexpired term, but in no case will it be in force more than seventeen years.

Protection to Inventors.

What is a patent? It is a monopoly or grant, in the United States, for a term of seventeen years, to the patentee, his heirs or assigns, of the exclusive right to make, use and vend the discovery throughout the United States, as the inventor's rights may appear in the specifications and patent granted.

This means a great deal to the inventor who has secured a *valid* patent containing all the claims so worded as to prevent infringement and loss in contest. Thousands of inventors, obtaining patents through unreliable and inefficient attorneys or agents, find themselves possessed of patents *in name only*, and of no value when combatted by infringers with capital and the aid of able legal talent. A good patent costs no more than a weak and worthless one. Therefore how shortsighted are those inventors who employ cheap attorneys, saving $5 or $10 in fees, only to find themselves loosers of *all* they have paid when the contest comes.

The Need of Reliable Attorneys.

The Revised Statutes of the United States provide that "before any inventor shall receive a patent for his invention, he shall make application therefor in writing to the Commissioner of Patents, and shall file in the Patent Office a written description * * * of the same in such full, clear, concise and exact terms, as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct and use the same; and in case of a machine, he shall explain the principle thereof and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions."

To carry out these provisions it is necessary for the inventor to first make a clear, concise and complete drawing, or a working model of his invention or discovery, and send it to THE INVENTIVE AGE, or some thoroughly reliable attorney, who, before making application for the patent, should make a thorough and rigid examination of the Patent Office to determine upon its novelty or patentability. If the invention has been anticipated by some one else, or if it lacks novelty, or if for any reason a patent can not be granted, or, if granted, would be of no worth or value, then the inventor does not want to incur the expense of making application and paying attorney's fees and government fees. For making this thorough examination THE INVENTIVE AGE and all reliable attorneys charge $5, which fee is, under some circumstances, however, taken out of the additional fees paid by the inventor in case letters patent are applied for. The fees of patent attorneys vary somewhat, but the average fees for obtaining a United States patent are about $65—the government fees being $15 on filing the application and $20 on issuing a patent—the balance being the fees for preparing specifications, making searches, etc. The inventor is sometimes favored in terms given for payment of the fees, more detailed information regarding which can be obtained by enclosing a 2-cent stamp with enquiry to THE INVENTIVE AGE, Washington, D. C. The reason why the inventor should have a preliminary examination of the Patent Office made before applying for a patent lies in the fact that if the case is rejected the fees paid to the government and the attorney are lost

All patents obtained through us will receive special mention in THE INVENTIVE AGE and in cases of unusual merit inventions will be illustrated free of charge to our clients.

This publication, reaching capitalists, manufacturers and business men throughout the world, is of value in assisting to bring an invention before the public in case its promotion or sale is desired by the patentee.

And What Do You Think of This?

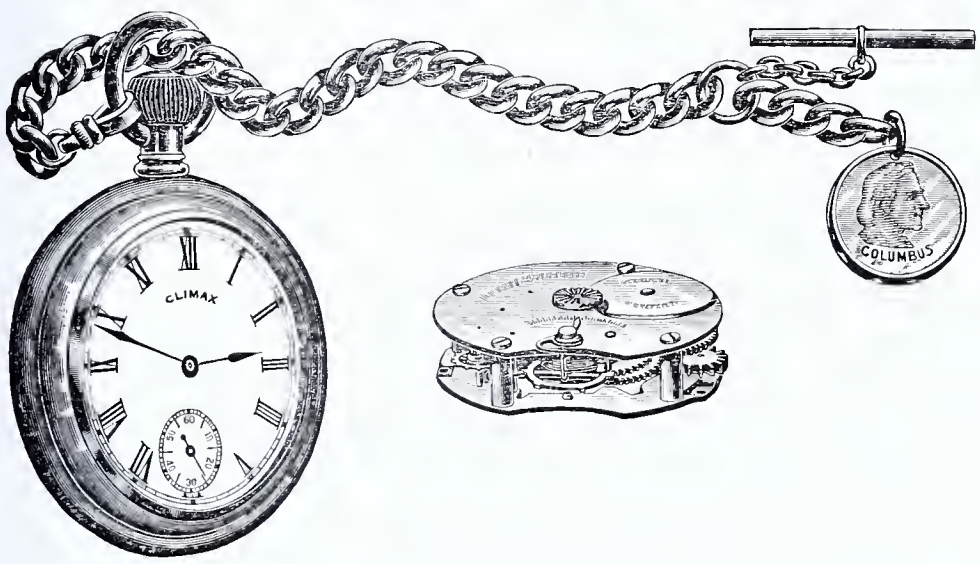
JUST OUT! BRAND NEW! ENTIRELY ORIGINAL!

$2. An American Stem-Winder.

A DUPLICATE IN QUALITY, APPEARANCE SIZE, ETC., OF ANY AMERICAN WATCH SOLD FOR LESS THAN $10.00

Our Watches are Positively and Unequivocally Guaranteed.

THE CLIMAX



EITHER ARABIC OR ROMAN DIAL.

This is the CLIMAX up to date. It represents the most important step taken in Watch evolution in many years. It describes a line beyond which nothing radical will pass for years, not only in the matter of PRICE, but QUALITY. The movement comprises many original patented features, and has been for years the subject of constant labor by one of the foremost of the foremost of expert and inventors.

DESCRIPTION.

CASES.—Two Styles, Plain and Imitation Engraved. Two Finishes, Solid Gilt and Nickel. Two Dials, Roman and Arabic. Snap Back. Heavy Bevel Crystal. Regular Stem Wind. Inside Stem Set. Regular 18 size Case. Chains assorted in each dozen.

MOVEMENT.—Regular American Lever, Lantern Pinion. Quick Train, 240 Beats per Minute Three-quarter Plate, Short Wind, Runs 30 hours to one winding. Dust Cap over Movement. Fully Timed and Regulated, and FULLY GUARANTEED for one year, the same as Waltham or Elgin.

The Cheapest Stem-Winding Watch Ever Produced.

PRICE $2. With "THE INVENTIVE AGE" one year, $2.50.

JUST PUBLISHED.

How to Build a One-Fourth Horse-Power Motor or Dynamo.

By A. E. WATSON.

Illustrated with full working drawings.

PRICE, PAPER, 25 CTS. CLOTH, 50 CTS.

Address "INVENTIVE AGE," Washington, D. C.

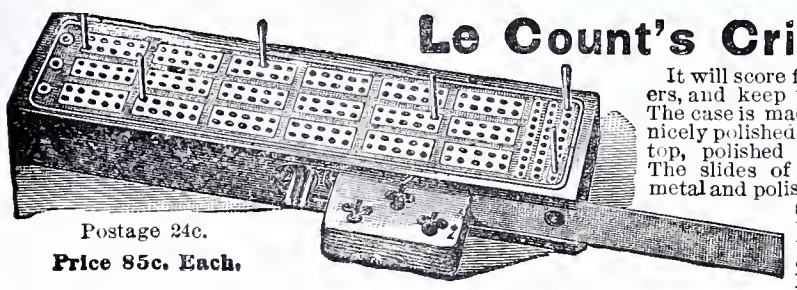
THE STAR FOUNTAIN PEN.

A solid 14 karat gold pen in highly finished hard rubber holder. The only fountain pen that will give perfect satisfaction, sold at less than $2.50. We warrant it in every particular and refund money when it is not satisfactory. A gold pen alone of the same value costs in any retail store more than we charge for the whole outfit. Writes 25 pages fools cap to one filling.

By mail, $1.50 each; $12 per dozen.

With "Inventive Age" one year, $2.

Le Count's Cribbage.

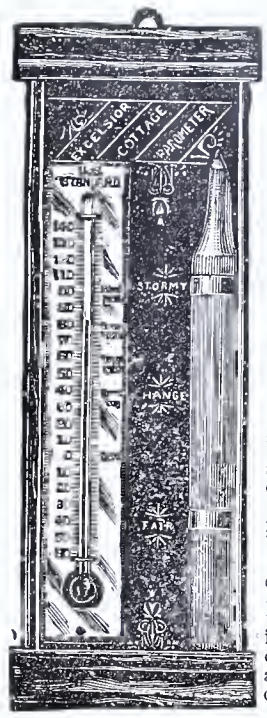


It will score for three or six players, and keep tally of the games. The case is made of black walnut, nicely polished; has a solid metal top, polished and nickel plated. The slides of compartments are metal and polished. This Board is superior to Boards that sell for three times the price. Full directions with each Board.

Postage 24c.

Price 85c. Each.

With "Inventive Age" one year, $1.60.



THERMOMETER & BAROMETER

COMBINATION.

Combination Barometer and Thermometer.—Our well known leader. Blue and Gilt back with metal side posts. Fancy top and bottom and handsome enough to decorate the home of a millionaire. Extra well made and dependable on for showing changes in both weather and temperature. One of the biggest bargains in our list. A handsome thermometer, together with a glass tube containing a chemical preparation which rises and falls by action of the atmosphere, foretelling correctly all changes in the weather. This is a new style storm glass and the most reliable ever known, being in use in all signal service stations. The slightest change in the atmosphere in some way affects this glass. The thermometer is also of the best quality. Both are enclosed in a stand with walnut top and bottom and blue and gilt back. On either side is also a strong metal bar giving the whole great strength and adding to its appearance. Altogether it is a most remarkable combination for the price and we take pleasure in offering it to our patrons

This is not one of the many cheap combinations of which the market is flooded which are neither good for ornament or use and can never be relied upon to forecast either the weather or in fact any thing else.

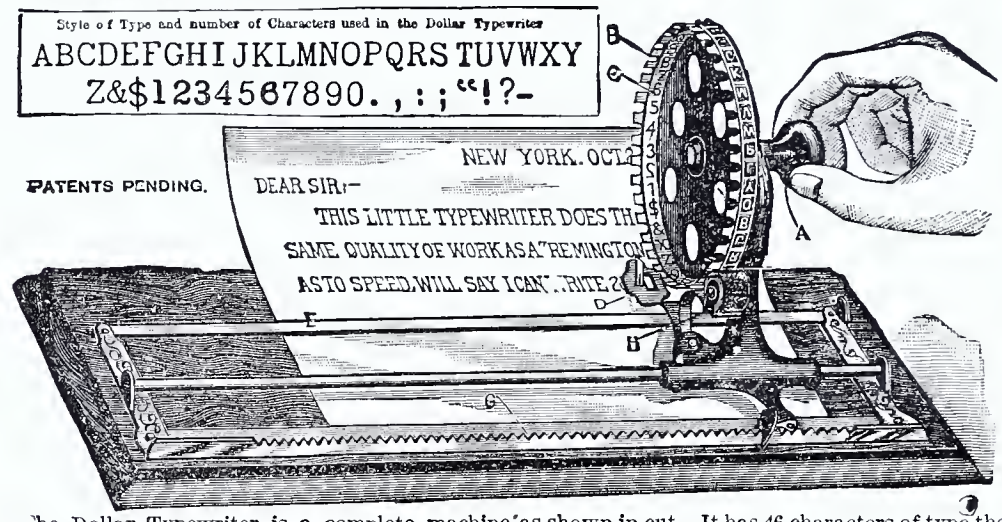
There is no reason for you to depend on the weather Bureau reports as every person who owns one of our Combinations, can make his or her forecast and tell exactly when it will be fine, rainy and in fact every change in the weather. With this you can tell whether to put on rubbers and a mackintosh or a pair of summer shoes and a costly dress. Don't take any more chances about the weather but be prepared. Each one packed securely in a neat box so that they can be mailed up without any fear of getting broken or damaged. Postage 10c. **Price 32c. Each; $3.00 Doz.**

With "Inventive Age" one year $1.25.

THE DOLLAR TYPEWRITER.

A PERFECT TYPEWRITING MACHINE.

Price only $1.00 by Express; $1.15 by Mail.

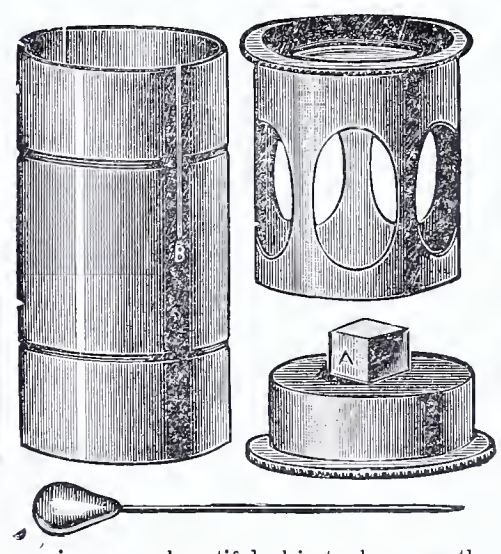


The Dollar Typewriter is a complete machine as shown in cut. It has 46 characters of type the same as that used on a Remington. It is provided with numerous patented devices for inking the type, holding the paper, spacing and governing the impression and allignment. It will write a postal card, note or full letter sheet and is particularly well adapted to addressing envelopes. It is a practical illustration of what a rare combination of ingenuity, skill and capital may do as it embodies many difficult and expensive mechanical movements which were heretofore only possible in high price machines. Over a **QUARTER MILLION** of these machines have been sold within the last year and the secret of its great success is that the manufacturers commenced with a foundation of original ideas and then spared no expense in putting them to practice by the use of the best machinery to be devised. If no more could be said of it this Typewriter is worth many times its cost as an instructor of children teaching and amusing at the same time, but its features of practicability commend it to the use of nearly everyone and the sale it has had and will have is not surprising. It **IS A PERFECTLY CONSTRUCTED** machine that will do work equal in quality to any of the high priced machines. It is so **SIMPLE** that a **CHILD CAN OPERATE IT** and will not get out of order. It is **LIGHT** and **PORTABLE**—just the thing for travelers. It is very **ATTRACTIVE** in appearance, made entirely of metal, mounted on a highly polished hard wood base. It will **WRITE RAPIDLY** with practice—15 to 25 words a minute. We **GUARANTEE** every claim for it, and if not as represented **REFUND MONEY.** The **PRICE** is but **ONE DOLLAR!** This is the age of typewriters, and no one should be without one.

Any typewriting that may be done with any of the high priced machines, from $100.00 down may be done with this one. It is now possible for **EVERYONE** to own a Typewriter and address and write their letters, postals, etc., in the same way the richest firms do theirs. The monopoly in Typewriters died when **"THE DOLLAR"** was born. Postage 15c. **Price $1.00 Each.**

With "Inventive Age" one year, $1.75.

COMBINATION MICROSCOPE.



Scientific skill and the greatest perfection in workmanship coupled with a very high magnifying power, distinguish this handsome microscope over all others ever offered at popular prices. It is specially imported from France, and readily sells for one dollar at retail. As regards power and convenience of handling, good judges pronounce it the best ever introduced for popular use. The cylindrical case is manufactured from highly polished brass, while there are two separate lenses—one at each end of the microscope. The larger glass is a convex magnifier, adopted for examining insects of various kinds, the surface of the skin, the hair, fur or any small articles. It will magnify the hairs on the hands or arms till they resemble large ropes, and it is a most interesting companion. The other lens is exceedingly powerful, and will clearly delineate every small object, entirely invisible to the naked eye such as the animalcules in a drop of water, fishes, feathers and the minutest insects. An interesting illustration of its great power may be had by placing a drop of sour flour paste upon the bottom of the lens, when on looking through the eye-piece, the sight of the writhing mass of thousands of worms, snakes and eels, is one never to be forgotten. Thousands of living animalcules can be seen in a single drop of stagnant water. An insects eye is a very beautiful object when seen through this microscope. It reveals hundreds of small eyes or six sided facets resembling net work or honeycomb, which enables the insect to see in all directions without moving its head. There are 4,000 of these little eyes in the single eye of a fly. It is invaluable in detecting adulterations in food, such as flour, tea, coffee, sugar, spices, milk and the fatal trichina spiralis or pork worm. Postage 3c. **Price 47c. Each.**

With "Inventive Age" one year, $1.35.

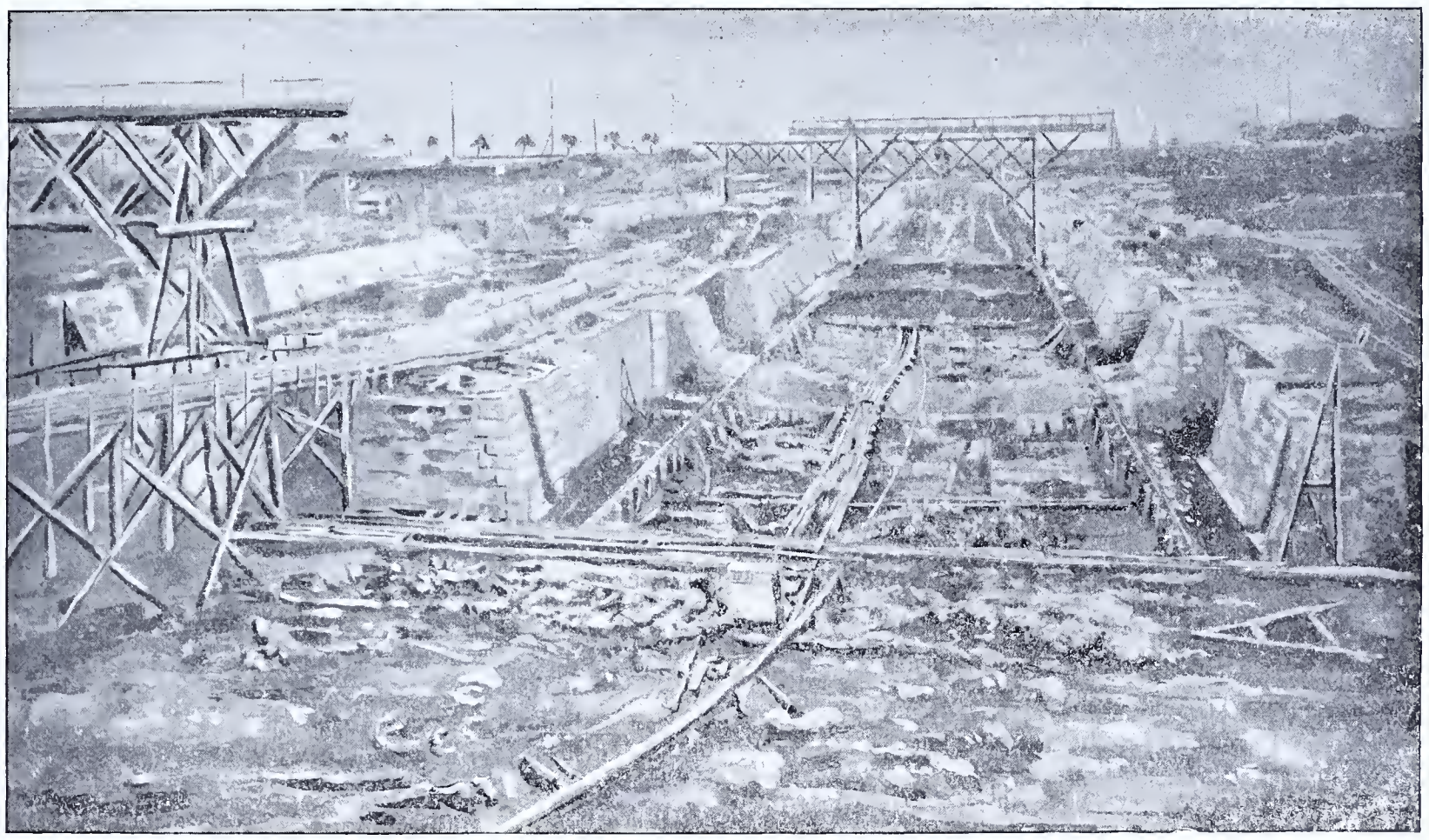
The Inventive Age
AND INDUSTRIAL REVIEW.
A JOURNAL OF MANUFACTURING INDUSTRY AND SCIENTIFIC PROGRESS.

Sixth Year. No. 7. | WASHINGTON, D. C., JULY, 1895. | Single Copies 10 Cents. $1 Per Year.

The Kiel Canal.

Some eighteen miles from the mouth of the Elbe, and about fifty below Hamburg, two short, well-finished, and stoutly built moles, surmounted at their extremities by lighthouses, mark the Brunsbuttel entrance to the Kiel Canal, and prevent the mud from silting up in the channel leading to the outer harbor pierced in the high bank protecting the low-lying land beyond. Two huge locks, side by side, connect this outer harbor with the inner harbor, a wide expanse of water flanked by extensive quays, and forming the enlarged terminus, so to say, of the canal proper, which stretches its whole length of sixty-four miles from the locks at Brunsbuttel to the locks at Holtenau without a break. At present there is no town or village at the Elbe mouth. The little town called Brunsbuttel, which gives its name to the spot, is some two miles away westwards.

For the requirements of the opening ceremony the work is sufficiently advanced, but what the place will look like months hence when the quays, buildings and storage yards are completed, can only be inferred from the handsome proportions, manifest substantiality, and splendid finish of what is already done. As a Government undertaking, the question of cost has not been considered. Everything has been carried out in keeping with the high imperial object in view, and when the various buildings distributed over the vast expanses of stone and brick paving are completed they will make a brave show. Throughout the canal's length one is impressed by this grand style of execution, the bridges, and even the embankments, being made as faultless as if for a model, while the stupendous nature of much of the work is eloquent enough of its stern purpose. A trip through the canal would, it must be confessed, be, all the same, a somewhat monotonous affair on the whole for anyone uninterested in engineering achievements. At the ferries, of which there are fourteen, one may chance on a little life and "local color"; and one meets not only a few picturesque sailing craft in tow of sturdy little tugs, which transform the dead stretch of water into a living scene. As time goes on there will, of course, be more movement. Still, the general conditions must remain pretty much the same, since the traffic can only seriously affect life at the two extremities. For anything in the nature of scenery the tourist must be content with the lakes just beyond Rendsburg, with, say, a break of half a day or a night to see this interesting old garrison town, the point of fusion with the Eider Canal.



KIEL CANAL DURING CONSTRUCTION.

For nearly twelve miles after leaving Brunsbuttel the level of the canal is higher than that of the land, and except the handsome width of water (197 ft.) between the two trim, brick-faced banks, there is little or nothing to cheer the eye. But from the second passing-station, a simple widening of the canal sufficient to enable two vessels of the largest size to pass one another, the banks begin to increase in height, culminating in the monstrous acclivities of sand across which leaps the enormous steel arch of the bridge near Grunethal. Eventually these embankments will be faced with turf, and will form a pleasing as well as an imposing vista. A few miles from this bridge the canal traverses Reit Moor a treacherous marsh, which engulfed several workmen and severely taxed the skill and resources of the engineers. The whole region seemed worse than fluid, for notwithstanding that the channel was fenced in by a substantial barrier formed of a double row of piles with a solid filling between them, no sooner was a sufficient depth dredged out than the bottom would rise as if forced solidly up from below. There was nothing for it but to dredge and dredge till the dredger triumphed. From hereabouts the river Eider runs more or less parallel to the canal, and one can espy the masts of sailing craft upon it.

Here, too, is the midway pilot station, where the pilot from Brunsbuttel or Holtenau, as the case may be, will be dropped and another picked up to complete the journey.

Four lines of railway cross the water way, two carried on aerial bridges and two on low-level hydraulic swing bridges. The construction of the latter is in some respects novel and ingenious, and, like everything else, perfectly finished, swinging and coming to with the utmost ease and smoothness. At Kendsburg a third swing-bridge carries the high road over the canal. From Rendsburg to Holtenau is by far the best part of the trip regarded merely as an excursion. For the first nine miles the channel is through two narrow lakes, with low wild looking banks, and studded with small islets, giving one the notion of steaming along a wide river. The adjoining country seems more populous. Already for some time a little passenger steamer has been plying on this part of the canal from Kiel. The ferries are more numerous and there are many primitive little landing-stages serving neighboring towns and villages. The banks are high, though not in the

(*Continued on page 107.*)

The Inventive Age

Established 1889.

INVENTIVE AGE PUBLISHING CO.,

8th and H Sts., Washington, D. C.

ALEX. S. CAPEHART. MARSHALL H. JEWELL.

The INVENTIVE AGE is sent, postage prepaid, to any address in the United States, Canada or Mexico for $1 a year; to any other country, postage prepaid, $1.50.

Correspondence with inventors, mechanics, manufacturers, scientists and others is invited. The columns of this journal are open for the discussion of such subjects as are of general interest to its readers.

Technical matter is particularly desired. We want practical information from practical men.

Nothing will be published in the editorial columns for pay.

The INVENTIVE AGE is thoroughly independent.

Advertising rates made known on application. Special facilities for furnishing cuts of any patented article together with descriptive article. Business specials 25 cents a line each insertion, 7 words to the line. No advertisement less than 50 cents.

Address all communications to THE INVENTIVE AGE, Washington, D. C.

Entered at the Postoffice in Washington as second-class matter.

WASHINGTON, D. C., JULY, 1895.

THE great state of New York heads the list of manufacturing commonwealths, and Pennsylvania is a close second. Massachusetts formerly held the third place, but owing to the enormous development of Chicago, Illinois has taken that rank.

RAILROAD CAR JOURNAL took advantage of the twenty-ninth annual convention of the Master Car Builders' Association to issue a special number giving the proceedings of the convention and much other valuable matter of interest to the members. It was a handsome number.

A NICARAGUA dispatch states that "the committee of engineers appointed by President Cleveland to examine the plans and route of the Nicaragua Canal have been much pleased with what they have heard and seen of the condition of the canal work. The canal line has been cleared between the lake and the western terminus, and the work of clearing the route from Greytown to Ochoa is nearly completed."

THE Philadelphia Press thinks "the wheat crop will be less this year than last, but at least 20,000,000 bushels of this shrinkage is due simply to the fact that this much wheat is grown more cheaply elsewhere. Our wheat crop is smaller by taking 2,000,000 acres out of wheat growing, but the world's supply of wheat is not reduced by this amount." The latest accounts indicate an unusually large crop of spring wheat in the Northwestern states, but the acreage is somewhat reduced.

THE establishment of the new Circuit Courts of Appeal, limiting the appellate business of the Supreme court, is aiding the latter body to make some progress in the direction of cleaning its docket. On the adjournment of the term last month about 640 cases were carried over to the October term. As compared with the opening of the October term in 1894, this is a gain of 74 cases. While this number does not seem large, at this rate not many years will intervene till the Supreme Court shall have cleared its docket.

THE conclusion of a recent editorial in the New York Sun was as follows: "As soon as a scientific man, or any other man, makes a discovery, and is perfectly sure of its newness, its importance and its demonstrability, he ought to stride into the open and make announcement of it, rather than to conceal it until somebody else lays claims to its authorship. We heard of a man the other day who made a discovery, or rather an invention, in which there was money, yet he died in poverty because he did not take the trouble to blow his own horn."

PRESIDENT Gilman, of Johns Hopkins University, has accepted the office of chief of the bureau of awards of the Atlanta Exposition, and has cabled to Paris for offers of designs for the medals, and, in order to avoid the friction with exhibitors arising from delay, announces that awards will be delivered to the exposition managers one month after the exposition opens. This piece of intelligence will be quite refreshing to exhibitors at the Columbian Exposition in Chicago who are still waiting for the medals that never came. Long after the possibility of their usefulness shall have passed, doubtless the Columbian medals will have been awarded.

IT will be remembered that the new American liners St. Louis and St. Paul are companion boats, built on exactly the same lines throughout. On its maiden trip, returning from Europe, and when only one day out from port, the St. Louis lost her rudder, but by the use of her twin screws was enabled to safely cross the ocean and steam to her moorings in New York harbor. This was a great victory for the twin screw invention. The rudder of the St. Paul was immediately shipped from St. Paul and attached to the St. Louis, thus allowing the great vessel to depart on schedule time on her second trip.

THE Illinois appellate court has recently handed down a decision which is of importance to all property owners in cities. Suit was brought to enjoin a street railway company from laying tracks upon certain streets, the owners of the property abutting on the streets claiming that the work would injure the value of their lots, and further setting up the claim that they had a right to decide as to what uses the street should be put to. The court holds that the property owners have no right whatever to jurisdiction over the streets; that they belong to the general public, which can make any use of them it deems proper, and that no injunction can issue.

ONE of the most ambitious undertakings of the day is the Baltimore-Washington Boulevard electric railway scheme. It is now well under way and its completion marks the beginning of long-distance electric transportation, the feasibility of which seems to have been settled beyond doubt. It is doubtless only a question of time when electric railways will connect all the more important New England farm centres and "four corners," thus enabling the rural residents to transport their products to trade centers quickly and at minimum cost. In many ways the agricultural masses promise to be benefited by the development of electricity.

IN the action brought looking to the disbarment of Geo. H. Holgate, of Philadelphia, from practising before the United States Patent Office on account of unprofessional conduct and alleged negligence in filing patent cases for his clients, the Commissioner decided in the defendant's favor. He said he did not wish to crush a man for life in disbarring him on the first charge, and he could see where the defendant may have simply been guilty of negligence. He would therefore give him the benefit of the doubt. Holgate claims that he had trusted his employees in the matter and that he was innocent of wrong doing. The Commissioner declined to go into the question of patent selling and this question is still in statu quo. In our next issue we hope to be able to publish a complete synopsis of the case and result of the investigations of the post-office department.

ALMOST half of the total population of the United States over ten years of age are to be classed as working people, says Bradstreets. This fact is brought out by some statistics lately issued in a census bulletin dealing with the occupations of the population. The total working population in 1890 was 22,735,661, or almost 48 per cent of the whole number of persons 10 years old or over. Of these 18,820,050 were males and 3,914,711 females. The numerical increase in persons engaged in "gainful occupations" since 1880 is shown to be 5,343,562, the increase in males at work being 4,073,008, and females 1,267,554. The greatest increase has been shown in the number of persons engaged in trade and transportation, which was almost 78 per cent, the increase for females being especially large, or 263 per cent. This increase is due principally to the large number of females now employed as bookeepers, clerks, stenographers, typewriters and saleswomen.

The Gilchrist Patent Fruit and Food Jar.

For the past 30 years the business of canning, or preserving fruits, meats and vegetables in jars, has steadily increased, and many millions of dollars of capital are invested in the manufacture of fruit and food preserving jars and cans; and also in establishments for putting up and shipping choicest fruits, meats, fish and vegetables; and hundreds of patents have been granted for different methods of excluding air or hermetically sealing the receptacles of fruit and other preserved substances. During the years gone by, the Mason jar, the Rowly jar, and the jars of many others which have become as household words, have proved great benefactions to the public. yet, strange as it may seem, only recently a patent was granted to a lady for a glass preserving jar, which overcomes defects even in the jars of the most approved types. Recently the question was asked what would be the type of the last man on earth, and the answer was "woman." This question and answer sets one to thinking, and in view of the fact that brain constitutes the essential part of the physical man, it is no wonder that a woman should be the patentee of this latest improved jar: and does not this achievement of woman sanction the belief that there is truth in the answer above given as to what will be the type of the last man on earth.

The fruit, meat, fish, and vegetable preserving jar referred to above was patented to Mrs. Ruth A. Gilchrist, of Wilkes Barre, Penn., on April 2, 1895 and the patent is numbered 536,870. This lady patentee, is a descendant of Gov. Carver, the first Colonial Governor of Mass., and also of the famous Indian Warrior, Col. Benjamin Church; and being possessed of large inventive and mathematical qualifications as well as high scientific attainments, with indomitable perseverance, she discovered, in experimenting in this branch of the arts, that the interior porcelain lining of the cover of the jar would, when made of just such a form, size and proportion, with respect to a glass jar having a neck of given size and proportion, expel every portion of air remaining with the fruit or food in the jar, and at the same time no overflow of destructive acidulated fluids upon the rubber sealing gasket would be experienced, and by thus expelling all the air, no moulding or deterioration of the contents of the jar could take place.

In constructing her porcelain lined covers she forms the lining with a deep, narrow, downwardly projecting conical central portion, and outside of this, she leaves a thin bevelled or rounded attaching flange. This lining, by reason of its construction, is adapted to have its thin flange enter one of the screw threads which are usually formed on the metal cap or cover, and to have said cover pressed or swaged upon it, and thus great cheapness of construction is secured, the cover produced consisting of only two pieces, viz., its screw threaded metal ring-cap, and porcelain lining. The conical projection of the lining extends down below both the bottom screw thread of the cap or cover and the gasket shoulder of the jar, and thus it can enter far enough into the jar amidst the food or fruit to displace and force the same into a space around itself, and thus cause it to act to fill every air crevice before the "air escape," afforded by the screw thread, is finally closed and sealed.

Patents have been granted on this jar in England, Canada and France; and applications for patents are pending for it in Germany and Sweden. A design patent for the form of the lining has also been procured in this country; and as the inventor is entering largely into the manufacture of the jars, she also has taken steps to get a trade mark in the form of a monogram, combining the initial letters of her name, which she intends specially to use upon her "Terrapin preserve jar," this being one of her latest and most celebrated preserved articles.

Any information in respect to the United States and foreign patents can be obtained by addressing Mrs. Ruth A. Gilchrist, 39 Hanover St., Wilkes Barre, Pa. or Mason Fenwick and Lawrence, of Washington, D. C., her attorneys.

An important invention is a combination of the telegraph and type-setting machine, by which, it is claimed, messages can be transmitted and put in type at the rate of fifty words a minute. The facilities for collecting and publishing news are becoming so great that a man who has anything else to do can't take time to read the half of it. The next advance should be in the direction of a news-condensing and digesting apparatus.

NOTES.

Highest Inhabited Point on Earth.—Up to a short time ago it was popularly believed that the highest habitation of man on the globe was to be found in a Buddhist convent in Thibet, where twenty-one monks devote their lives to the adoration of Buddha at an altitude of some 16,000 feet above sea level. It has been established lately, however, that a colony of mine laborers, exploiting for a London firm the tin and bismuth mines on Mount Chorolque, in the Bolivian province of Chichos, are living in a settlement more than 17,000 feet above tide water.

* * *

Porcelain from Asbestos.—A French chemist has obtained a new substance, somewhat resembling ordinary porcelain, by the manipulation of asbestos. The fibres of asbestos are exceedingly fine, and give an almost impalpable powder. From this powder a paste is made by the mixture of water, which is thoroughly kneaded and moulded into the desired form. By heating the article in a crucible to a temperature of 2400° Farenheit, a porcelain is obtained with a translucency comparable to that of ordinary porcelain. An electrical expert who has employed porous cups of this substance, says they have much less resistance to the electrical current than the ordinary cups in use.

* * *

Protection of Steel from Rust.—Professor Calvert, according to *Invention* has arrived at the conclusion that the carbonates of potash and soda possess the same property of protecting iron and steel from rust as do those alkalies in a caustic state. Thus it is found that if an iron blade is immersed in a solution of either of the above carbonates, it exercises so protective an action that that portion of the iron exposed to the influence of the damp atmospheric air does not oxidize, even after so extended a period as two years. Sea water, to which the carbonates in suitable proportions have been added, is said to produce similar results.

* * *

Highest Bridge in the World.—The highest bridge of any kind in the world is the Leo River viaduct, on the Antofagasta Railway, in Bolivia, South America. The place where this highest railway structure has been erected, is over the Melo Rapids, in the upper Andes, and is between the two sides of a canon, which is situated 10,000 feet above the level of the Pacific. Counting from the surface of the stream to the level of the rails, this celebrated bridge is exactly 636½ feet in height. The length of the principal span is 80 feet, and the distance between abutments (total length of bridge) is 802 feet. The largest column is 314 feet 2 inches long, and the batter of the pier what is known to bridge builders as "one to three." The guage of the road is 2 feet 6 inches, and trains cross the bridge at a speed of thirty miles an hour—*Manufacturer and Builder.*

* * *

The Greatest Forest in the World.—Siberia from the plain of the Obi river on the west, to the valley of the Indighirka on the east, embracing the great plains or river valleys of the Yenisei, Olenek, Lena and Yena, is one great timber belt, averaging more than a thousand miles in breadth from North to South—being fully 1,700 miles wide in the Yenisei district—and having a length from East to West of not less than 3,000 miles. The forest of Washington, northward through British Columbia and Alaska is probably the largest continuous timbered area in North America, while that in the valley of the Amazon, including Guiana, Colombia, Ecuador, Bolivia, Eastern Peru, and Northern Brazil, the largest on this continent. The preservation of the forests is an exceedingly important question.

* * *

To Prevent Corrosion.—In a recent "La Metallurgie" is described an invention which consists in the deposition, by means of an electrical current, upon the surface of iron, nickel, white iron or zinc of a thin anti-corrosive coat of a metallic oxide, either bioxide of manganese, sesquioxide of molybdeum or bioxide of lead. Before applying this, the article to be coated is well cleansed by one of the well-known processes used in electroplating of oxides and greater matter. To form the layer of bioxide of manganese upon iron, steel or nickel the article is attached to the positive pole of the electric current, and put in a bath containing, to 100 litres of water, from 50 to 1000 grammes of nitrate of protosulphate of manganese and from 1 to 2 kilogrammes of nitrate of ammonia. To form the molybdic coating on iron, steel or nickel, the bath consists of 100 litres of water containing 100 grammes of molybdate of ammonia, and 1 to 2 kilos of nitrate of ammonia, the article being connected with the negative pole. To deposit bioxide of lead on iron, steel, zinc, white iron or nickel, the bath contains for 100 litres of water, from 500 grammes to 1 kilo of nitrate of lead and 1 to 2 kilos of nitrate of ammonia, the article being joined to the positive pole The electric current required in these three processes is comparatively weak and ranges from .3 to .5 ampere per square centimeter.

The Berliner Decision.

The opinion of the U. S. Circuit of Appeals in the Berliner case has, at last, been handed down, and is in its way a most extraordinary example of the diversity of opinion which may be created by identical arguments. Judge Carpenter, it will be remembered, held that the Government had proved both of its propositions, which involved, first, negligence on the part of the American Bell Telephone Co. in the issuance of the patent, under the well-known Miller vs. Eagle Mfg. Co. decision, owing to the issuance of a prior Berliner Patent. The Circuit Court of Appeals take exactly opposite views, holding that the proofs show that the American Bell Telephone Co. was not responsible for the delay which occurred, and if more than unusual delay be alleged, the burden thereof must indeed rest upon the Patent Officials, and not upon the Bell Telephone Company. This is a most extraordinary view to take of the case. While it apparently exonerates the Bell Co. from the charge of laches, it is a most severe reflection on the Government, and more particularly on the Patent Office. Announcement has already been made of the change in the rules requiring inventors to be more diligent in the prosecution of their claims, but the opera bouffe innuendo that the Patent Office was, in fact, hostile to the Bell Telephone Co., with a disposition leaning favorably toward the application of Drawbaugh ought not, we think, to be allowed to go unchallenged by the officials of the Patent Office. To some, perhaps, the proposion here put forward may appear little short of ludicrous.

Having thus disposed of the question as to whether or not the Bell Co. displayed due diligence the Court takes up the question of the prior Berliner patent, and its effect upon the patent at issue. One would have supposed that the magnitude of the interest involved would have called forth some definite expression of opinion, but the Court has fought shy of this most important point, under the plea, practically, that it has no jurisdiction in the case at the present stage of the proceedings, and in the form of the suit as brought by the Government! In other words, the Court holds that the United States itself cannot sue for the cancellation of a patent granted by its own officials, and that if the patent officials erred in issuing the patent, it was an error of judgment only, and not a mistake in law. The question, therefore, as to the validity of the Berliner patent of 1891, in view of the prior Berliner patent, is left exactly where it was before the Government suit was filed. This must be considered, in many respects, a very hopeful sign for the future. In avoiding entirely passing upon the merits of this part of the Government contention for the nullification of the Berliner patent, it leaves this most important point entirely unprejudiced to be argued before another court in a suit for infringement and by parties whose personal interests are involved. If the case be carried to the Supreme Court, which seems doubtful, it will delay final adjudication in the matter possibly for a year or more, and it is doubtful whether the American Bell Telephone Company will undertake to molest alleged infringers by applications for injunctions. Should the case, however, not be certified to the U. S. Supreme Court, there is little doubt that the Bell Co. will, at once, begin an active campaign of litigation, which will probably be started by a suit brought in the Massachusetts circuit. Possibly such a suit may be brought against a not unfriendly infringer, and, if such be the case, we will probably see application made by the recently organized association of telephone manufacturers to be allowed to intervene as co-defendants. We are more than ever of the opinion expressed in our editorial of May 22, that the telephone situation is by no means hopeless, and with Judge Carpenter's decision already squarely against the Bell Co. on the main point, the chances are in favor of this view being sustained in a subsequent suit, and of the nullification of the Berliner patent.—Electrical Engineer.

The pith from cornstalks is now thought to give promise of a satisfactory material for use in war ships to allow shot to pass through it and then close to exclude water.

The Kinzua viaduct, near Alton, Pa., was designed and finished in eight and one-half months without the use of scaffolding or even a single ladder. It is 2,100 feet long and three hundred feet high.

The Kiel Canal.

Continued from first page.

same sense as at Grunethal, and have mostly received the finishing touch. In fact, till Holtenau is in sight one comes across but few and trifling patches of unfinished work. In one stretch it would be easy to imagine oneself traversing an English park, so carefully laid is the masonry at the water's edge, so smooth the turf above it, and so dense and rich the foliage of the trees enclosing the waterway. About a couple of miles from Holtenau is the second great steel bridge. Parties of excursionists come by the little steamer from Kiel to the stopping place close by, and climb on to the bridge to survey the country around, but the view is not worth a sight of the structure itself. The Holtenau end is in the same state as that at Brunsbuttel—the great locks finished; not so the inner harbor.

The general conditions, however, are not quite the same. Holtenau being less than four miles from Kiel, there is not the same call for dock and other accommodation. It is also within a sheltered tideless haven, and needs no protecting moles. Finally, it is in picturesque surroundings with hills and trees and facing wooded shores, not a mere inlet in the muddy border of a great and occasionally turbulent river. Except for the civil engineer the Baltic Canal is not so much a thing to be seen. Nor is its commercial importance a very great matter. The dues for vessels using it are not high, and

BRUNSBUTTEL GATES OF KIEL CANAL LOCK.

doubtless there will be a considerable traffic of tonnage in the aggregate. For vessels engaged in the German coasting trade between ports east and west of the canal the saving of time will be immense; and likewise in a lesser degree for all Baltic trade from the west and south-west.

On the other hand, it must be borne in mind there are no first-class steamers in these trades, and the value of time to such as are must not be estimated by what it means to a mail-steamer. A really weighty point in favor of using the canal is that it avoids the navigation of the Skagerack, the Cattegat, and the Sound, the coast lines of which, in a wreck-chart, are so burdened with the little black discs denoting the total loss of a ship as to resemble a highly prolific forcing-bed of bacteriological spores. But all these considerations sink into insignificance by the side of the naval importance of the canal. There can be no shadow of a doubt that whether the dues amount to much or little, in spending her millions in making a safe waterway between Kiel and the Elbe, Germany has acted most wisely. By some experts its naval value is put concretely at fifteen men-of-war. Be that as it may, its defensive value could hardly be over-estimated. The naval lesson of her last war has not been neglected by Germany. It is generally supposed that virtually nothing instructive happened, but the Germans really learnt things of immense significance, if they were largely mere confirmation of past experience. The Kaiser may well feel proud of this great undertaking, for the thoroughness of which he is personally entitled to the chief credit, and which has been carried through without any of the riot or irregularities on the part of the laborers that have invariably accompanied all previous undertakings of equal magnitude, and from which, thanks to the admirable arrangements for their comfort, many of the men, it is said, will retire with a competency.—*Illustrated London News.*

A 25-Tons Capacity Wrecking Crane.

Even with the most efficient systems of car inspection, breakdowns and wrecks are incident to railroad operation. These wrecks are due to failures in car equipment and numerous other causes familiar to railroad men, and it is very essential upon well-managed railroads to have suitable appliances for the removal of wrecks and the maintenance of traffic. Whatever the system of wreck removal employed by different railroads, upon one point all men of experience agree: it is essential for efficient operation to have powerful lifting and pulling devices. With the increased weight of equipment used in recent years, the hand power appliances for these purposes have proven quite inadequate to meet these changes, and the necessity for rapid freight and passenger transit requires something better. The steam wrecking crane is not a new device upon railroads, but the problem has been how to devise a machine capable of dealing with heavy equipment and still keep its weight such that it may be quickly carried upon ordinary roadbeds, and at the same time be reasonable in cost.

In the design of such a machine for these purposes, features of importance present themselves at once. The essentials are large capacity with restricted weight upon the roadbed, a contraction in dimensions to allow it to travel in ordinary trains, and, of great importance, a universality in its design and use, and quickness in operation.

The accompanying illustration shows one of four machines recently built to fulfil this service for the Boston & Albany and Norfolk & Western railroads by the Industrial Works, this type meeting the general conditions as outlined above better than others.

With the revision in the general designs they have produced a crane of a capacity of 25 tons, lifting in any position at a jib radius of 16 ft. In general this crane may be described as follows: The car frame is 22 ft. long, 10 ft. wide, and is mounted upon eight steel-tired wheels, four of which through their axles are arranged in pedestal jaws, these four wheels serving for drivers, the car being self propelling. The crane proper is mounted upon the car, and may swing a complete circle, lifting on either sides or ends. All motions of hoisting, slewing, self-propelling and varying the jib radius are accomplished through a pair of engines. The boiler serves as a partial counterweight to the load in all positions.

The most thorough construction is given the machine in all its parts, and cast steel is liberally used. The jib may vary its radius from 16 to 20 ft., and with an extreme radius and side lifting, the telescopic outriggers attached to the car are used. The air brake, canopy, etc., complete the equipment.

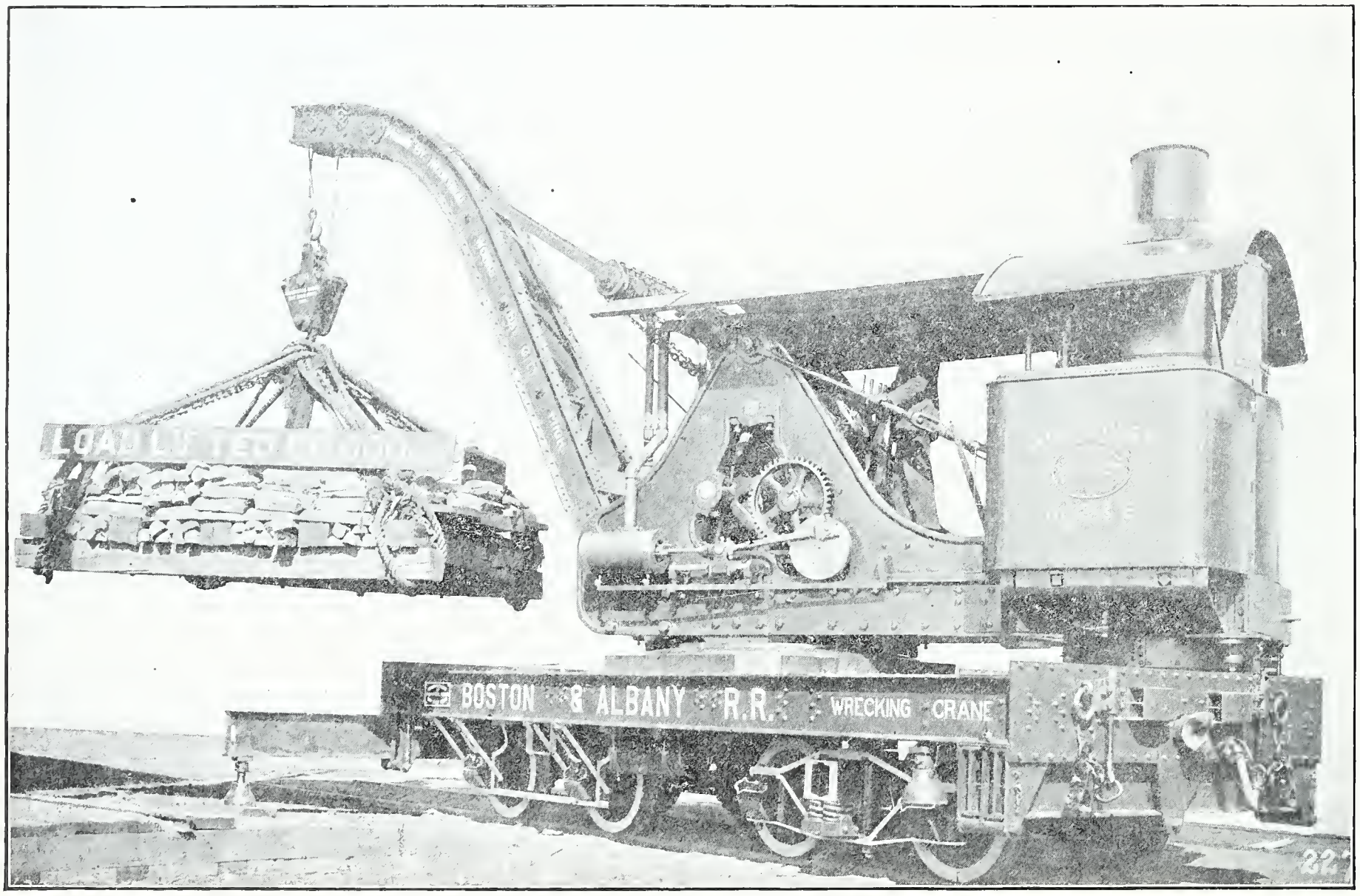
The manufacturers of this machine believe it to be the most powerful portable crane yet designed for use upon standard gauge tracks, and for its general utility in constructive service upon railroads, as well as for its first use, it may be used successfully.

We are indebted to *Railroad Car Journal* for the illustration used herewith.

The Chinese-Japanese war has cut off the source of supply of camphor, and there is likely to be a dearth of this article for some time. From Japan and China a goodly proportion of the camphor used by the medical world and in domestic economy comes, through the camphor tree, or camphor laurel, is cultivated to some extent in Formosa, Java and the West Indies.

Cheap Illuminating Gas.

Acetylene has been known to chemists as the lowest of the hydrocarbons—the lowest in hydrogen and the richest in carbon. Its manufacture has been too costly for utilization for illuminating purposes until a short time ago, when Mr. T. L. Wilson, of Spray, N. C., by merest accident discovered a comparatively inexpensive way of making it. He was trying to form an alloy of calcium, using an electric furnace in his experiments. He had melted some lime and powdered coal together, when, to his disappointment, the mixture fused into a heavy, semi-metallic mass, and, to get rid of it, he threw it into a bucket of water. It was a lucky throw. The water, to his surprise, effervesced violently, and gave out a heavy garlic-smelling gas which Mr. Wilson soon identified as acetylene. The solid proved to be carbide of calcium. Calcium carbide, then, is decomposed in water, the water itself being also decomposed. In recombination the oxygen seizes upon the calcium, forming calcic oxide (lime), and the hydrogen unites with the carbon in the right proportion (C_2H_2) to form acetylene—a gas which far surpasses all other hydrocarbons in illuminating power. Mr. Wilson says that a pound of calcium carbide will yield 5.3 cubic feet of gas. He is now manufacturing calcium carbide on a large scale in North Carolina, and expects to be able to produce it for $5 a ton, which would enable the gas to be sold as low as five cents a thousand cubic feet! It can be sold in liquid form in cans for country houses, or even generated on the spot for individual lights. Ordinary burners are too large for this gas. The smaller burner provided for it lets out but one foot an hour and gives a flame of 50 candle power, with only one-half the heating power of common gas.



WRECKING AND CONSTRUCTION CRANE—BOSTON AND ALBANY RAILROAD.

Clothes Made from Wood.

Time was when reference to a "wooden overcoat" were understood as the irreverent equivalent of measuring a man for a coffin, but it would seem that suits of clothes made of wood may soon be an accomplished fact. The writer is indebted to a merchant of the city of cloth—Leeds—for a glimpse of samples of a species of cloth, and also of a sort of cotton, made wholly out of wood fibre, these two woven pieces having all the appearance of attractive articles of their own kind. Both these novel textile fabrics are the result of prolonged experiments with pinewood and spruce, which have been ingeniously torn to pieces in the first instance and then bleached by an elaborate chemical process. After chemical treatment in many ways the wood becomes a soft, wite pulp, which is run through perforated plates, the resulting threads being dried by a steaming process. These threads can be woven, and the material is susceptible of taking readily any sort of dye. The fabric can be made at an astonishingly cheap cost; it looks well, and has a certain amount of strength (experiments in this connection are now being carried out), and its appearance on the market, sooner or later, is absolutely certain, especially in the form of imitation cotton. —*Edinburg Scotsman.*

An important invention, now making a place for itself in textile manufacturing, is a loom which feeds the bobbins into the shuttle automatically. As this hitherto has been one of the chief duties of the weaver, the new device promises to supplant a considerable amount of labor. Five persons can take care of eighty of these looms, where now six looms are most commonly assigned to a single operator. They can be run an hour or two after everybody has left the factory at night and throughout the noon hour, when the operatives are at dinner. How important the invention is may be judged from the fact that, where tried, it is saving one-half the labor cost in weaving, and about one-fourth the whole labor cost of manufacturing.—*Springfield Republican.*

The New Palatial Lake Steamer.

The average American traveler, accustomed as he is to the many luxuries of modern transportation, nevertheless is always on the alert for any innovation that caters to his creature comforts, whether it be in the shape of elegance of surroundings, ease and comfort of sleeping accommodations, speed of his transporting medium, or mere table novelties. In the early history of the great lakes the passenger steamboats that plied between Buffalo and upper lake ports were supposed to be the acme of transportation facilities, but with the advent of the exclusively passenger steamships, each accommodating 450 passengers, of the Northern Steamship Company that ply between Buffalo and Duluth, in connection with the great Northern Railway, the march of improvement has eclipsed the old style of steamboat not only in elegance of appointment, novelty of arrangement, elaborateness of detail, and superiority of cuisine, but in speed as well.

These steamships, North West and North Land, are the most perfect craft of their kind in the world. Each steamer is 386 feet long, 44 feet wide and 30 feet moulded depth, 7,000 horse-power non-explosive steel boiler, electric light, and an easy sailing speed of 20 miles an hour. These ships cost $850,000 each. In finishing and furnishing they are equal to the finest ocean steamships ever built, while the table shows corresponding superiority. The construction in every part was carefully planned and carried out with the view of making these vessels the most modern, the strongest, safest and most luxurious afloat.

The vessels have been built of mild steel throughout, with an inner bottom extending from the collision bulkhead forward to the afterpeak bulkhead aft. They have been built under special survey in order to obtain the highest classification in the U. S. Standard Rules. The hull has been specially strengthened and subdivided through transverse and longitudinal bulkheads into numerous watertight compartments, several of these bulkheads extending to the spar deck, without any doors or openings cut through, and where it has been found necessary to have passages through the bulkheads, specially designed water-tight doors have been fitted which can readily be closed in case of emergency. The construction throughout has been planned and carried out with the view of making these vessels not only the most modern and luxurious, but also the strongest and safest conveyances on the lake.

The entire space on the spar deck has been devoted to the accommodation of first-class passengers. The state-rooms are arranged in a double line along the sides of the vessel, and are all handsomely finished and fitted out, well lighted and ventilated. Many of the rooms are provided with sliding doors, so that two staterooms, if desired, may be used as one. Several large and more sumptuous sta'erooms with private bath and lavatory connected, have also been provided for.

On the port side of this deck are located toilet and bath rooms for ladies, while on the starboard side are the bath rooms and lavatories for gentlemen. The barber shop is also on this deck, next forward of the gentlemen's lavatory.

At the fore end of the hurricane or promenade deck a large deckhouse has been fitted with exceptionally large and handsome state-rooms. The entire house is beautifully furnished in paneled white mahogany, and every conceivable convenience for the comfort of the passengers has been provided.

Another deckhouse has been fitted up aft for a length of 115 feet. This house has also exceptionally large state-rooms and has its own interesting features. With the exception of the cabins at the sides, the house is entirely open from end to end, a very large and handsome ladies' cabin and music saloon occupying the fore end, with a handsome double staircase leading to the spar deck. The after end is fitted up as a reading-room, and is so constructed as to command an unobstructed view astern.

A large well has been formed in the deck, and together with the very handsome dome skylight, which extends throughout the whole length of the house, gives it a grand and lofty appearance.

All state-rooms, bath-rooms and lavatories are supplied with running water, and the system used for the plumbing and drainage is the most perfect that can be devised.

After viewing from the dock the graceful sweeping lines of the hull, one is in no way disappointed when he steps aboard and examines the interior. At the first glance one is struck with the refined and quiet taste, the harmony of color and design, the elegance and richness of every appointment. The radical changes from the old style of treatment is a departure that will be hailed with delight by lovers of the artistic and appreciated by the general public.

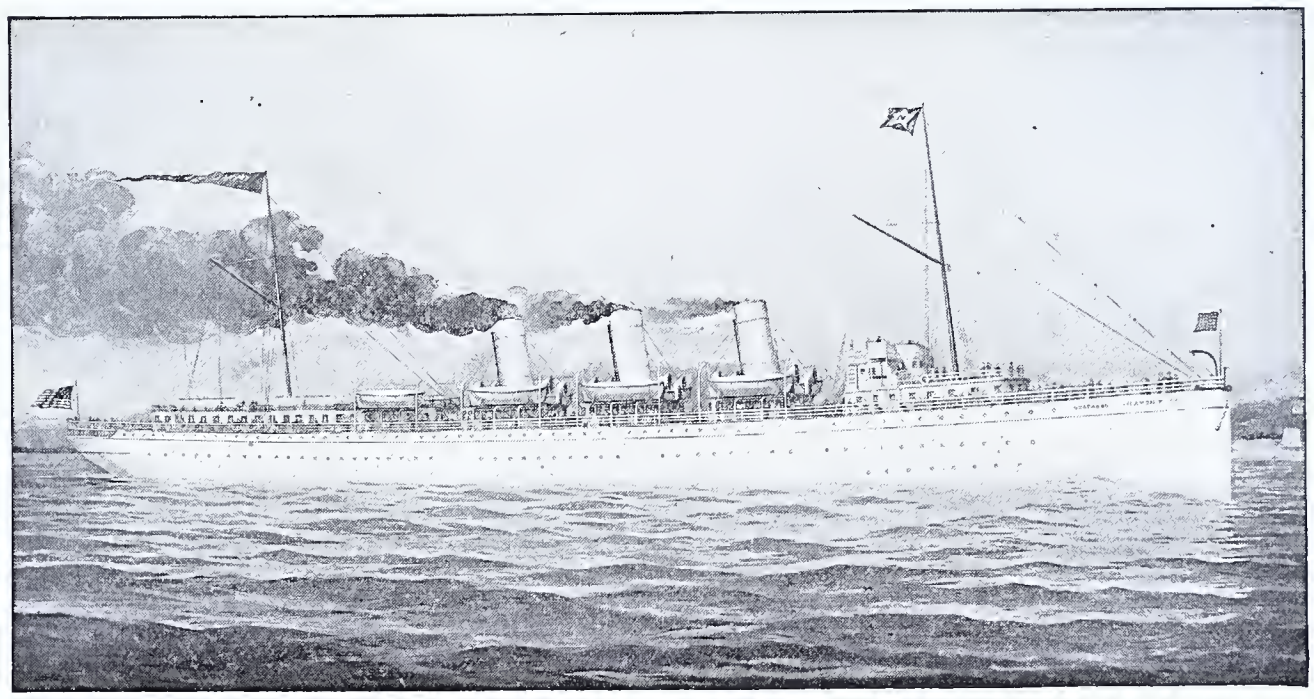
Every detail has been studied with care, and carried out so far as possible, under the personal supervision of the artist and designer.

The time-honored pine woodwork finished in white gloss paint and a superabundance of gilding, has given way to a rich mahogany finish, spirited carving, soft coloring and a judicious use of gold—all combined to produce an elegance and harmony at once pleasing and beautiful.

There has been a lavish but judicious use of relief work in all portions of the boat susceptible of decorations, such as the panels in the grand saloon, the coves and on the ceilings. The style adopted in all the finishings and furnishings, as well as the decorations, is a modified "Rococo." This same motive will be found to run through the design in the woodwork, metal-work, glass, furniture, upholstery and carpets. It has been the endeavor of the artist to impress one with a sense of refinement and elegance, rather than show and glitter, thereby giving to the grand saloon more the appearance of a parlor than the cabin of a steamboat. This is shown more in the ladies' saloon on the hurricane deck, where luxurious easy chairs and divans, book cases and writing decks, and a grand piano, together with the mirror on the staircase and the beautiful stands for flowers, make a picture second only to the cozy retreat in the aft end of the same deck.

The state-rooms are attractive in appearance and complete in all their appointments—excepting the bed fronts and the doors, that are of mahogany—the finish is of a light cream color, with gilding—the drapery, upholstery and carpets are of a color to harmonize. The rooms forward on the hurricane deck are finished in white mahogany, and furnished with full-sized bedsteads of special design.

The smoking-room on the hurricane deck is finished in white mahogany—has a tessellated floor, and the upholstering is of dull terra cotta leather.



THE NORTHERN STEAMSHIP COMPANY'S STEAMSHIP NORTHWEST.

It has been the purpose of the management to build the finest boats on the lakes—that shall be remarkable for their thorough construction — their safety — speed and beauty — to the critical admirer of marine architecture and nothing to be desired—the decorations and furnishings to appeal to cultivated taste and to be of a character to please and attract the general public.

We are indebted to the *Railroad Record* for this description of a new floating palace. Fuller information regarding these steamers can be had by applying to A. A. Heard, General Passenger Agent, Buffalo, N. Y.

LOW RATES TO DENVER.

The B. & O. R. R. Co. will place on sale at all ticket offices on its lines east of the Ohio River round-trip tickets to Denver, Colorado Springs, Manitou and Pueblo, for all trains of July 2, 3, 4, and 5, valid from starting point on day of sale and good returning from Colorado points July 12 to 15 inclusive. The rate from Baltimore and Washington will be $47.50, and correspondingly low rates when from other stations. Tickets will be good via St. Louis or Chicago.

Charles L. Culver, of Springfield, Mass., has patented an electric carriage for pacing wheelmen, which is expected to bring the record for a mile down to a minute. It has three wheels, is 11 feet long over all, pointed at the front end, and from 4 to 5 feet high. The carriage is mounted on ordinary bicycle wheels, with pneumatic tires. The motive power is derived from a storage battery, applied to the rear axle. The operator controls the motor which steers the machine by means of a lever. Three-horse power is required to run the machine, which weighs 700 pounds.

Electrical House Heating.

A current of electricity always heats the conductor through which it goes. The conversion into heat of the electrical energy is always complete; there is no loss, as in most other transformations, and in a given conductor the heating effect increases as the square of the current, so that twice the current gives four times as much heat, three times the current nine times the heat, and so on. It therefore becomes possible to produce almost any desired temperature, even to that of fusion of an electric conductor, while the most refractory substances are either fused or volatilized by the heat of an electric arc which has the temperature of about 6,000 degrees Fahrenheit.

A constant current will maintain a constant temperature. How much heat shall be produced and what the temperature shall be, is only a question of apparatus, and regulation is as easy as turning a switch. Electrical heating for household purposes is therefore as feasible as heating for welding iron bars or fusing alumina. Houses may be thus heated as easily and as safely as they are lighted by electricity. It has often been talked about, but the inquirers have generally been discouraged by exaggerated notions of its relative cost. The implication has always been that people always choose the cheaper article, which is not true.

For instance, a Rochester lamp may give a light of 30 candles for six hours by burning a quart of oil, costing 2c. The same amount of light from an incandescent electric lamp will cost as much as 10c., nevertheless there are thousands who choose the more costly light because its other good qualities are considered a sufficient offset for the greater cost.

Ordinary furnaces for heating houses are not half so economical as individual stoves, but no one uses the latter who can contrive to pay for the former; so in matters of convenience the cost of a thing is not the first item.

The convenience of electrical heaters in a house, their cleanliness, and the simplicity of their regulation, commend themselves to everyone, and when these are fairly apprehended by the well-to-do class, it is certain that such electrical appliances will be demanded and hot air and other furnaces will be abandoned, and with them will go the nuisances of handling coal and ashes, the consequent dust and gases, the smoky chimneys, the dangerous flues, the preparing of kindling, and the expert care of the furnace with its drafts and registers.

There will be increased safety from fires, and the cost of insurance will be less. When the cost and trouble of these are set over against the cost, the convenience and safety of electric heat, the difference will not be found to be so great, but it will be willingly borne by large numbers in most communities. Once this method has a fair start, it is certain to be adopted as widely as the electric light has been, and then will soon be as indispensable.—Cosmopolitan.

Street railways with electric traction are promised for Cairo next year, the concessionaires being Belgians; and Alexandria is expected soon to follow suit. There are several bidders for a concession for an electric tram line from Cairo to the Pyramids, a distance of 10 miles, to accommodate the enormous number of winter visitors to the capital. The Egyptian ministry recently had from a Frenchman a serious application for permission to build a "funicular" railway to the top of the great pyramid. The request was not considered.

The Driven Well Patent and its Results.

In a recent issue of the *Washington Post*, Mr. Bunyea, an assistant examiner in the Patent office, published an article in relation to the Driven Well patent, and showing that it, more than anything else, was the cause of the hostility manifested in Congress of late years towards the Patent Office.

What he says in that regard is true, but there are many facts connected with that patent with which I presume he is not familiar; and inasmuch as that patent has done more than all other patents ever granted to create hostility to the patent system, I desire to state that the patent office is responsible for all the trouble and litigation growing out of the existence of that patent, and the feeling of hostility to which it gave rise. Like some other patents, the patent to Green should never have been granted: first, because the idea was old many years before, as shown by the patent office records; and second, because he did not invent it.

It is shown and described in a patent issued to L. Disbrow, March 24, 1825, and still more completely in a patent to E. Rice, of Salina, N. Y., dated Nov. 26, 1840, more than forty years before Green's pretended invention!

In Rice's patent he shows and describes fully how the tube is forced into the earth, and he says that it had before been done with iron tubing, and his invention consisted in a peculiar form of wooden tubing with an iron point for the purpose.

Had the patent office properly performed its duty, by finding and citing these prior patents, there would not have been any patent granted to Green or anyone, and of course all the subsequent litigation, trouble and annoyonce, which gave rise to the ill feeling and annoyance among the farmers and their representatives in Congress, would have been avoided.

Besides that, Green did not invent it, as already shown by the testimony in the interference between him, Mudge, and Suggett, of record in the patent office.

Mudge made the invention, but the Office first awarded the patent to Suggett, whose only claim was that he invented the perforated point. The Board of Examiners-in-Chief reversed that decision and awarded priority to Mudge, but on appeal the then Commissioner awarded priority to Green, and that decision was confirmed by the Court on the absurd ground that as Green and Mudge were in the military service, what Mudge did inured to the benefit of his superior officer, Green! Now the fact was, Mudge was not in the military service at that time, nor until months afterwards, when he joined another regiment as sutler, went to the front, remained a few months and returned home, where he found Suggett busy putting down the wells, when he, Mudge, applied for his patent, which was issued to him October 24, 1865.

Finding it defective, he applied for a reissue in a few months, and while that was pending Green made his first application March 14, 1866, and then the interference was disclosed between Green, Mudge and Suggett.

HOW THE INVENTION WAS MADE.

From the testimony, it appears that Green was raising a regiment, and Mudge was then teaching them the drill. One morning the news came that some Union soldiers had been poisoned by poison thrown into a well where they had encamped, Green suggested that it would be a good thing if someone would invent a means by which a well could be sunk wherever the troops might stop, and thus prevent the possibility of the water being poisoned; and, turning to Mudge, said: "Mudge, you are an ingenious fellow, suppose you try it."

That same day Mudge tried and succeeded. On reporting what he had done, Green suggested he would like to have one at his house, whereupon Mudge bought some pipe, got a party to assist him, and put down the first of those tube wells at Green's house. He also put down several others in the neighborhood for others before he joined the army. Green then bought the material for putting down a well and took it as far as Albany, where the authorities declined to forward it, holding that it was not properly a military supply. And that is all Green ever did, so far as the invention was concerned. How he got the patent I have already stated.

In the meantime, during Mudge's absence, Suggett, who was a well-digger, had devised his point for the tube and had put down some thirty wells, but he disclaimed being the inventor of that method of putting down a well, and claimed only his improvement, as follows: "The perforated point, a, with the pointed end, b, constructed as a drill and united with a pump, all substantially as shown and described," while Mudge and Green both claimed the broad idea of procuring water by forcing a tube into the ground to a water-bearing strata, and attaching a pump.

In Green's patent, as originally issued, the plan he showed and described was to first force a rod down to make a hole, draw up the rod and insert a pipe, and he neither described nor suggested any other way. But Mudge and others found they could drive the tube itself down when provided with Suggett's point, and so Green applied for a reissue and inserted that idea into his patent.

That reissue was not applied for until more than two years after the issue of his patent, and yet it was sustained by the Supreme Court, although the Court has since held that a patentee cannot reissue unless within two years from the original issue of his patent, and that he cannot show, describe or claim anything not in the original, all of which Green did.

THE LITIGATION.

There were nine suits in the U. S. Circuit Courts in various states, three or four of which were appealed to the Supreme Court. In the last, 6000 parties in Minnesota and Iowa were sued. By agreement of counsel, a test case from each State was taken, and the trial was had at Des Moines, Iowa, before Judges Shiras, Love and Nelson, sitting together.

In all the prior litigation, the defence being mainly conducted by lawyers not familiar with patent law, there was not set up the fact of public use for more than two years prior to Green's application, nor these earlier patents. The testimony in the interference in the patent office showed that more than thirty of the wells had been put down by Mudge and Suggett at least four years before Green's application; but up to that time it had always been held by the Circuit Courts and the office that such prior use was not a bar to the granting of a patent, nor would it render the patent invalid, unless it was shown that such prior use was with the knowledge and consent of the applicant or patentee.

In the suit at Des Moines, these two points were raised by counsel for the defence.

The case was decided against Green on the ground that the patent was invalid because of more than two years' prior public use, and also because of abandonment, two of the judges so holding, the other dissenting.

It was appealed to the Supreme Court, which, for the first time, held that two years' prior public use was fatal; and then, in 1886, three years after the patent had expired, and forty-seven years after the two-year clauses in the act of 1839 was passed, the patent was wiped out and the public for the first time informed as to what the law really was.

Altogether, it was one of the most remarkable cases that ever occurred, both as to the action of the patent office and of the courts. It was stated in a speech of Gov. Alger that the litigation, first and last, had cost twenty-five millions, though that was no doubt an exaggeration. That it was costly is shown by the fact that the printing of the testimony for the complainants in the last appeal to the Supreme Court cost $3,500, the court refusing their request to dispense with the printing of it.

This case illustrates the importance of having the examinations in the patent office properly conducted, and the necessity for Congress furnishing the necessary means for securing that result. It also shows the necessity for a special court, similar to the Court of Claims, for the trial of patent cases, —a court composed of judges who shall have a practical knowledge of mechanics as well as of patent law, and which shall always be in session, so that cases can be decided within a few months, so that the public and parties interested in patents may know as soon as possible what the law is—what their respective rights are, and where they stand.

The Patent Office is the only self sustaining bureau this government has or ever had; and with $4,500,000 surplus in the Treasury, every dollar of which was paid by the inventors and their assignees, and who pay their proportion for the support of the government in addition, the same as all other citizens, there is no excuse for Congress not furnishing the facilities for promptly and properly, deciding these questions.

THE BENEFIT TO THE FARMERS.

It is proper to add, that notwithstanding the improper grant of the patent, and the costly and lengthy litigation, the introduction of the driven well has been of immense benefit to the farmers and stock growers of the west especially, as well as to the public generally.

It was stated before the House Committee that the saving to the public, on the number of wells then in use, had been not less than fifty millions of dollars.

In that connection, a laughable circumstance occurred. Mr. Baker, a member from Indiana, had introduced a bill "to protect innocent purchasers," —one of about two hundred similar bills that have been introduced since 1878, and which, if passed, would practically wipe out the patent system. He was before the committee advocating his bill, and was making a regular whang-doodle speech on the outrages perpetrated by these drive well men on his constituents.

Why, said he, I had one of those wells put down and the owner of the patent actually had the impudence to demand a royalty from me!

Chauncey Smith, of Boston, who was present, said, "Mr. Baker, may I ask you a question?"

"Yes, Sir," said Baker.

"What did they ask you," said Smith.

"Twenty-five dollars for the well and $5 royalty," replied Baker.

"Well, now," said Smith, "what does it cost to dig and stone up a well and put in a pump in your region?"

"About $60 or $65," said Baker.

"Very well," said Smith, "don't you think you made a pretty good bargain, when you get your well, pump, royalty and all for thirty dollars, or half price, according to your own showing?"

This was very much like sticking a knife into a toy balloon, and, like it, the member from Indiana collapsed. His bill was not reported.

While none of these men, Green, Mudge or Suggett, should have had a patent for this method of sinking wells, yet they did the public a great benefit, just as Fulton did when he made a success of the steamboat invented a century before, and as Cyrus W. Field did, when he made a success of the Atlantic cable, which he did not claim to have invented.

The introduction of an invention is oftentimes more difficult than the making of the invention, and the men who do it are none the less public benefactors, even though they were not the original inventors.

In this case the invention went almost of its own accord, as soon as it became publicly known, and that was one of the reasons for so much litigation.

It cost only about $50 to $75 for the outfit necessary to put down a well, and parties went around putting them down in all parts of the country. They would put them down in a township or county, get their pay and clear out.

As it was not an article that was manufactured and sold, like other patented articles, the patent being for the method and not for the article, and the owners of the patent being unable to find the parties who put down the wells, and who were generally irresponsible if found, the only remedy was to sue the parties found using the wells, and thus it was that there were so many individuals sued.

The same spirit of hostility existed among the farmers against the barbed wire patents, but without any reason whatever, for under those patents no user was ever sued—only the infringing manufacturers. Besides, it was shown by the agricultural press that up to 1884 the saving to the farmers and stock men of the United States had been over $55,000,000.

In fact, while the public generally suppose that it is the manufacturers who are mainly benefited by by patents, it is susceptible of easy demonstration that the farmers have been as much if not more benefited by our patent system, and the inventions to which it has given rise; and it is surprising that they should seek to kill the goose that has laid its golden eggs for them. It is simply want of information and reflection on their part, and the encouragement given by demagogues, who hope to gain their support by such a course.

It is, however, gratifying to know that since the expiration of these patents the feeling of opposition has largely decreased and it is to be hoped that the coming Congress may be induced to amend the law and provide the patent office with more and better facilities for properly and promptly performing its important duties.

Few persons who have not given the subject special study, have any idea of what the patent system has done for the United States. While politicians argue that it is the tariff that has built up our manufacturing industries, and hence make the tariff an issue in every campaign, it is true that our patent system has done as much if not more for the growth and success of both the manufacturing and agricultural interests of the country, as the tariff has. This is a subject that would require a volume to do it justice, and for which you have not the space or I the time at present.

W. C. DODGE.

Washington, D. C., June 26, 1895.

Kindling locomotive fires with oil is a complete success, and the cost one-eighth that of using wood.

An experimenter once drew out of the body of a spider 3,480 yards of the thread—a length but little short of two miles.

A fabric woven of spider's thread is more glassy than that from the silkworm's product and is of a beautiful golden color.

A correspondent of the *Scientific American* living at Denver observed that soap bubbles, set adrift when the temperature was about 14° below zero F. froze and fell to the ground hollow spheres of iee. When the temperature rose to zero the bubbles would not freeze, "whether from change of temperature or change of air could not be ascertained."

SCIENCE FOR YOUNG PEOPLE.

Conducted by E. P. Lewis.

A brief account was recently given in this department of the discovery of the new element, argon, one of the gases which make up the earth's atmosphere. This accidental discovery seems to be leading to the finding of several other new substances. As has been previously explained in these columns, when the sunlight passing through a narrow slit and a prism is examined, it is found that the resulting spectrum is caused by a number of dark lines. Investigation has shown that these lines are due to the absorption of certain colors by gases in the sun's atmosphere. These gases, when themselves luminous, will, when examined through a prism, show corresponding bright lines. In this way a large number of the lines in the solar spectrum have been absolutely proved to be due to the presence in the sun of substances familiar to us on earth. When the so-called "prominences," which consist mainly of huge flames of burning hydrogen on the sun's surface, are examined through the spectroscope, a bright yellow line is seen, which, until recently, has never been shown to be caused by any substance known to us. To the unknown element the name "helium" has long been given. Shortly after the discovery of argon by Lord Rayleigh and Professor Ramsey, the latter endeavored to find argon by chemical analysis of various minerals. In examining cleveite, a mineral which he had obtained from Norway, he collected from it a quantity of a peculiar gas, much lighter than any other previously known, except hydrogen, which it exceeded in weight nearly four times. On making this gas luminous by passing an electric spark through it, a bright yellow line was found in its spectrum which seems to coincide perfectly with the position of the helium line. Further investigation seems to point to the existence in cleveite and other minerals of still other light gases in chemical combination with various substances. We seem now to be on the verge of very important discoveries in chemistry, which may lead to very valuable industrial applications.

* * *

We usually look upon our vision as the most trustworthy witness of the existence of external objects which it is impossible to have. Nevertheless, our eyes sometimes play us curious tricks and show us things which do not exist. Many instances of optical illusions are described in books on physics. One of the most recent and interesting of these illusions is that of what is known as the artificial spectrum top. One of the simplest forms is made of a disc of white cardboard, one-half of which is painted black. On placing this disc on an ordinary spectrum top and causing it to spin rapidly, these dark lines appear to be of all the colors of the spectrum. The effect cannot be due to the imagination, for it is seen by persons who have no idea of what they are expected to see. Another form which gives similar results is made by tracing a spiral black line on a white disc from the center to the circumference, the width of the white space between the lines being at least five or six times that of the lines themselves. Another disc entirely black is made. Both discs are slit radially from the centre out and fitted over each other so that each about half covers the other. On spinning the arrangement on a top the colors are seen as before. At present there seems to be no satisfactory explanation of this peculiar optical deception.

* * *

It seems incredible that Indians and other uncivilized races could, without tools, work hard rocks into arrow heads, knives, hatchets and pipes. Yet it has been shown that this is not such a difficult and tedious task after all. In the National Museum is a case filled with specimens of such implements which were made by a white man as an experiment in a few hours. The softer rocks were chipped into shape by harder ones, and the surface smoothed by scouring with sand. Holes were drilled, even in hard rock crystal, by a wooden or copper hand drill which was constantly fed with sharp sand or emery and water. One of the most ordinary forms of drill used by savage nations is what is known as the "pump drill," which most boys are familiar with. It consists of a round wooden shaft a foot or so long, which passes through a hole in a bar of wood. Two strings come from the ends of the bar to the top of the shaft, where they are fastened. If these strings be wound tightly on the shaft and the cross-bar pressed downward, the shaft will rapidly rotate and finally wind the cords up in the opposite direction. On again pressing down the motion is repeated in the opposite direction.

* * *

It has been found that nearly all substances will absorb and retain considerable quantities of gases in which they may be placed. Water contains several per cent of its own volume of oxygen and nitrogen from the air. This should make us very careful about exposing water, milk or other liquids that we intend to drink to injurious gases or vapors. Even metals will, when heated, absorb surprising amounts of some gases. A nickel wire has been made to absorb more than 100 times its own volume of hydrogen, whereby its length was considerably increased. Palladium will absorb several hundred times its own volume of hydrogen. The condensation is so great that the hydrogen must be liquified and seems to form a kind of alloy with the palladium. The attraction between the metal and the gas must be marvellously strong to do this, for only recently, by the application of the greatest cold and pressure, has anyone succeeded in directly liquefying hydrogen. Some other metals are almost equally active, and finely divided platinum wire will absorb oxygen so rapidly that it will become red-hot during the process.

* * *

The brightness of a flame depends on the presence in it of solid particles which become red hot. Pure hydrogen, when burning, gives more heat than any other substance, but it is a pale blue, almost invisible. To secure light from such a flame it is necessary to heat some solid in it. The intense calcium light, for instance, consists simply of a piece of chalk heated to incandescence in a jet of burning hydrogen. Ordinary coal gas consists of some hydrogen mixed with other gases containing more or less carbon. The particles of carbon liberated by the heat furnish the illumination. Some of the carbon is actually burnt, that is, it unites with the oxygen of the air, but it is not this that furnishes the light, it is the unburnt white-hot carbon. These unburnt particles will be deposited in the form of soot on any cool solid held in the flame. No soot will be deposited from a non-luminous flame. Ordinary illuminating gas may be made to furnish either a luminous or a non-luminous flame, as is seen in the case of what is called the Bunsen burner, which is constantly used in chemical laboratories. This burner is very simple in design, consisting of an upright iron tube, several inches high and about half an inch in diameter. Gas is admitted through a rubber tube. At the base are two small holes which can be closed when desired. When open air mixes with the gas as it rises up, a non-luminous flame is produced. This is due to several causes, First, the gas is diluted by the inactive nitrogen of the air; second, the flame is cooled by the entering air; third, and perhaps most important, the additional supply of oxygen introduced into the flame from below causes the burning of a greater number of the particles of carbon in the interior of the flame. On closing the air holes, a luminous and very smoky flame is produced.

We see, then, that without carbon we would have no convenient source of light, for in the candle flame, the gas flame, the filament of the incandescent light, and in the electric arc, it is the white-hot carbon that produces the illumination.

The Aerial Tramway Company proposes to carry tourists across the Niagara River over the brink of the cataract, and thirty feet above the raging waters. A double set of cables will be stretched from the towers in the Canadian and American parks, with a supporting tower on Goat Island. On these cables cage-like cars will be suspended by trolleys and operated by electricity from the American side. The floors of the cars will be perforated to allow visitors to look below, and the side view will also be unobstructed.

A new and breech-loading rifle has been invented by a Des Moines man, the structural plan of which is decidedly novel. A working model was recently tested. All its operating parts are made to move in and through the series of guides on tracks so that the movement of each is positive and is susceptible of the highest possible speed. It has a reciprocating handle, a breech piece, a cartridge magazine formed to receive its entire load of cartridges at one insertion, and these parts are so connected with the actuating handle that a single back and forth movement accomplishes the loading and firing of the weapon. Its speed is said to be from six to ten times greater than that of any other rifle now used by the United States, England, France or Germany.

Freezing a Bed of Quicksand.

On the Speedway at High Bridge, New York City, a work is now going on of considerable interest to engineers. There is now a huge hole in the ground along the Harlem River, which will be even longer and deeper before the work of securing a foundation for the Speedway retaining wall is completed. Though somewhat similar steps have been adopted once or twice in the history of engineering science before, never have the same intricate problems been presented as now. The success of this experiment will be watched, therefore, with interest. The work necessitates sinking a retaining wall to a rock foundation along the river side of the Speedway, and engineers' soundings at this particular point located this rock eighteen feet below the surface. Whether their sounding rods struck a detached stone here or not is not certain, but it has developed that hard bottom is probably twenty feet lower than supposed at the outset.

After sinking their sheeting to what was presumed to be the required depth, it was found to be too short, and then a bed of quicksand developed, and no headway could be made. In this emergency the expedient of freezing this bed of quicksand and water so that it would not overflow the excavation for the wall's foundation had to be adopted.

The plan is to freeze the bank whence the flow of mud and sand comes, so that a solid wall will be formed, next which the excavation may be sunk to the required depth—probably thirty-five feet or more.

To accomplish this a row of four-inch pipes, about three feet apart, capped at the bottom, have been sunk perpendicularly to a depth of forty feet. Into each a smaller pipe, open at the bottom, has been inserted to within an inch and a half of the bottom. By means of a huge condenser cold air is forced through the small pipes into the larger, and returned for forther service into the condenser. It has been possible thus to use air cooled by expansion to about fifty degrees below zero, and the effect of this intense cold upon the flowing mud and quicksand has been to solidify it. With a coffer dam to exclude the water of the Harlem, the excavation is now being slowly sunk to rock.

In America there are 1,313 paper mills, employing 50,757 employes and using an aggregate of 603,837 horse power for driving them.

There are 83 national cemeteries in all, containing 330,700 honored dead, and upon these cemeteries the government has expended up to the present time $3,000,000.

It is stated that in addition to the Kyoto, the first opened in Japan, March 21, 1895, another road is to be built between Kobe and Amagasaki, a distance of fifteen miles.

One of the curiosities of the Havemeyer (German) cemetery is a tombstone made in the shape of a gigantic lead pencil. It is of "half rounds" of red Italian granite, fitted around a core of graphite over eight inches in diameter.

Review Table.

In the July number of the Cosmopolitan are the last verses ever written by Robert Louis Stevenson, and are in reference to the portrait of himself, which is given to the public with his verse for the first time. The lines might have come from the pen of Burns, and are inimitable in their way. The portrait was declared by Stevenson himself to be the best ever painted of him. In this same number Rudyard Kipling tells an Indian story, to which Remington adds charming illustrations; Mrs. Burton Harrison makes a serious study of New York society in "The Myth of the Four Hundred," and Kate Douglas Wiggin contributes a story of one of the most delightful of Welsh retreats. The Cosmopolitan was with this number reduced to ten cents per copy, and as a consequence, notwithstanping its large edition, it was "out of print" on the third day of publication.

* * *

Cassier's magazine for July.—*Niagara Power Number.*—This number is beyond question the most elaborately gotten up magazine on Electrical Engineering and kindred topics of scientific interest that we have ever seen. The descriptions and illustrations of the great Niagara Tunnel and its by-ways are unsurpassed in point of thoroughness and artistic skill. This periodical should be in the hands of every civil engineer in the country and will also be read with interest by those who have no technical knowledge of the difficulties to be overcome in utilizing the vast power of this great natural wonder. The number is profusely adorned with half-tone views showing all the details of the work as well as portraits of those interested in the enterprise, and is a marvel in the way of illustrative art.

* * *

The review of reviews comes to us this month in an attractive garb. Timely articles on the monetary questions that are now agitating and vexing the political world; on the Bond Syndicate about which there has been so much criticism; also an important article on the leaders of the political affairs of New South Wales. A valuable contribution to archaeological literature is given in an account of the researches of Prof. Plougeon, among the prehistoric ruins of Yucatan. Other articles are furnished in this almost indispensable compilation of notes on current topics.

Tests of the Famous Maxim Gun.

Successful tests of the murderous Maxim automatic rapid-firing gun took place on 9th ult. at the Sandy Hook proving grounds before the Ordnance Board, under the direction of James Huber, the expert of the Maxim-Nordenfelt Gun Company. Nothing more harmless or toy-like in appearance could be imagined than the Maxim gun, yet in power and deadly execution the great guns of the Navy are only novices in comparison. It is in general use in the European armies, but this test was the first official test made in this country. Major F. H. Phipps and Captain Frank Heath of the ordinance board, conducted the tests and Captain Charles S. Smith, Lieutenants Pierce and C. L'H. Ruggles were also interested spectators. Although descriptions of the gun and its deadly execution have made it familiar to the majority of American Navy officers, yet few had ever seen it actively at work. It is safe to say that those who witnessed Mr. Huber's exhibition were convinced that it was not a weapon to be despised.

The gun tested weighed twenty-five pounds, or forty-five pounds when packed in its case with additional parts of the mechanism and ready for transportation. It is mounted when in use upon a tripod and consists of a single barrel attached to a box-like affair, which contains the rather complicated machinery. This, as Mr. Huber declared, could be arranged to fire either one shot a week or 600 a minute. The ammunition, which is .303 calibre, is fed to the gun by belts containing 100 cartridges each, and these are exploded by a trigger arranged in a handle similar to that of the ordinary revolver. As long as the trigger is pulled back the gun will send forth a steady fire of death-dealing missiles. The instant the trigger is released, the firing ceases. In the heavier guns, the barrels are kept cooled by water jackets. The recoil of the barrel operates the whole mechanism, so that the motive power cannot get excited in use, like an ordinary weapon. Thirty-eight grains of smokeless powder are used in each cartridge. While in action the gun costs $24 a minute for continuous automatic firing.

The test began by general firing at a flag 500 yards distant, the tests being for rapidity and not accuracy. Single and bunch shots were made, and then a volley of fifty shots was fired in five and four-fifths seconds. Supposing the gun to be packed and upon the soldier's back, the next test was to ascertain the time it would take to prepare the gun suddenly for firing. Mr. Huber was the soldier, with the gun dismantled and strapped in its case upon his back. In less than fifty-eight seconds from the giving of the word he had the gun in position and was firing at the rate of 500 shots a minute. It appeared impossible that any living thing could withstand the storm of bullets which poured from the muzzle. Indeed the accuracy, so far as displayed, seemed to be fully as wonderful as the extraordinary rapidity of the shots.

Mr. Huber was then asked to show how quickly the mechanism could be changed in time of action, if it were out of order. He was to fire a shot which was supposed to break down the mechanism and fire another shot, the time to be taken between shots. The extra mechanism was strapped in the gun case, but the change was made with ease in twenty-six and two-fifth seconds. The same test was made with the barrel, which was supposed to be heated, and the change was made in one minute twelve and two-fifth seconds. All the parts were duplicated in the forty-five pound weight that Mr. Huber carried, and there was not a possible tight situation that the experienced officers could suggest that he was not equal to. In continuous automatic rapid firing, the gun would last for about 50,000 rounds ot the rate of 600 a minute, but of course this continuous speed in the light guns could not be kept up, owing to the necessary changes of barrels and mechanism.

The effectiveness of the gun may be best summed up in the words of a military man: "It is the most deadly instrument of war I have ever seen. I have been told it was only a toy, whereas the accuracy and reliability of its firing are simply appalling."

Dr. Max Wolf, of Heidelberg, discovered four new planets in February, making the number now known as probably 404.

Platinum wire made white hot by an electric current is said to be used instead of saws for felling trees.

A new magazine rifle, invented by an Italian officer, Captain Cei, fires twenty cartridges automatically, without requiring any change in position on the part of the soldier. The firing may be intermittent or continuous at will. At a recent trial in the Caseine at Florence, before the Prince of Naples, the twenty shots were fired in two seconds and all hit the target.

A Long Electric Road for California.

R. S. Dickson, of Placer County, Cal., states that the work of constructing the Marysville and Auburn Electric Railway has been commenced. It will cover nearly fifty miles of track. The purpose is to afford the orchardists and farmers in the foothills easier facilities for getting their products to market at lower cost. Passengers will be carried, as well as freight. It was the first intention to have this line run from Marysville to Nevada City. By the route adopted it will be placed directly on the Central Pacific trains at Auburn and sent East at lower rates. This electric road will tap one of the most productive parts of the state, where everything from an orange to a pumpkin grows, and in abundance.

The power for the electric road will be furnished by the South Yuba Water Company, whose supply is inexhaustible.

The power plant will be situated near the line of the road below Grass Valley, where the water company's canal will be given a fall of from 70 to 90 feet. After the water is used for the power plant, it will be taken up again in canals and carried on for many miles for irrigating the lower lands.

The South Yuba Water Company is fitting up a 1000-horse power plant at Newcastle, Placer Co., for lighting purposes. It will furnish electric light for New Castle, Penryn, Loomis, Rocklin, Roseville and Antelope, and the surplus electricity will be carried into Sacramento. Not only will electric light and power be furnished to the towns stated, but every farmhouse and the public roads along and contiguous to the line will be lighted from the same source. The officers of the Company state that as soon as Sacramento demands more electricity, they will put in additional plants and give any quantity desired. Along their irrigation canal they have made twelve or fifteen "drops," varying from 40 to 150 feet, where electric plants can be established at but little cost. Several small plants have been placed at these drops, where manufactories have been or will be established.—Elec. Engineer.

Do Patents Insure Justice to Inventors?

An eminent writer says that patents in many cases do not insure justice to inventors? He points out many cases of this nature. An original idea may be developed and improved by a number of inventors, one taking up the work where another left off, but without reaching a saleable form. At last a practical-minded man makes a slight improvement which turns failure into success and makes the article saleable, and he secures a patent. The original inventors, who did the most of the work, get nothing.

Again, two inventors may conceive the same idea at or near the same time, and come into the Patent Office, each asking for a patent. One will be granted a patent while the other will get nothing.

It is undoubtedly true that a man may conceive a new and valuable idea and spend much time and money on it without being able to complete it, and without producing a saleable article. Still other men may work out impracticable ideas of a similar or kindred nature without producing a saleable article. Then, when the field has been well cultivated, when costly and laborious experiments have been completed, when trial has shown what is *not* successful, a practical-minded inventor may step in and in a comparatively short time devise a small improvement which will turn failure into success and make the article salcable. And this last-named inventor may secure a patent for his improvement. He may thus head off the original inventors and prevent them from completing their own inventions. He may prevent them from reaching the goal and securing the reward of their labors. He may by means of his patent obtain a monopoly of the invention in its practicable form and make a large fortune; and the original inventors, without whose labors he never would or could have made his invention, receive absolutely nothing.

It must be remembered, however, that the original inventions, even though not successful commercially, may, if new and meritorious, receive patent protection. The Commissisner of Patents does not ask whether an invention will be a commercial success; he merely asks whether it is new and useful. Hence the last inventor will be under tribute to the first just as the first is under tribute to the last. In such cases the inventors generally effect an agreement whereby the profits are equitably divided.

It will be observed, also, that the original or first inventor has the advantage. The last inventor must use the original idea, upon which his improvement is based, but the first inventor may generally devise one or more ways to get around the narrow patent of the last inventor.

It must always be borne in mind that the object of the patent laws is not, fundamentally and primarily, to help the inventor, but to benefit the people in general. The Constitution provides that Congress may establish laws to promote the progress of the useful arts. In order to induce inventors to "promote the progress of the useful arts" they were to be granted, for limited times, the exclusive right to their respective inventions.

It will be seen that the object of the Constitution was to benefit the public rather than to reward the inventor. The reward or grant was provided as an inducement to "promote the progress of the useful arts."

Hence the patent laws, under the Constitution, must be framed so as to benefit the public as well as to help the inventor. It would not be justice to the people to grant to the original inventor the exclusive control of his invention and also all improvements made by others. Such a law would operate against improvements and would retard rather than promote progress. It is better that injustice should be done in some cases and that some inventors should go without reward than that the "progress of the useful arts" should be retarded. It was the last straw that broke the camel's back, and it is the last improvement that makes the original idea practicable. The public is interested only in the commercial article. Hence the last inventor must be rewarded even if need be to the exclusion of the first. The patent laws reward those who produce practical and useful articles rather than those who produce only ideas and theories.

When two men conceive the same idea at or near the same time, and they make similar models, and then come into the Patent Office, each asking for a patent, it seems unjust to reward the one and deny the other. Why not give each a patent?

It may be said in reply that it is impossible to secure absolute justice in this world. This is shown on every hand. A thousand men may be searching for a gold mine. Nine hundred and ninety-nine try and fail. The thousandth man tries and is successful. The nine hundred and ninety-nine have found where the gold is *not*, and the thousandth man profits by their labors. Without the nine hundred and ninety-nine the thousandth man probably would have dug where they dug and failed. Then why not reward all the thousand men alike and give each a title to the gold mine?

A man commits a murder and is hanged. He is guilty. But his father was to blame. His bad companions were to blame. The man who sold him whiskey was to blame. If it had not been for his inconsiderate father and his bad companions and the saloon man he would not have committed the murder. Then why not hang his father and his companions and the saloon man also?

A man drives across a bridge and the bridge breaks down. If it had not been for the ten thousand men who drove across the bridge before him and wore it out he would not have broken through. Then why not punish the ten thousand men?

If a man goes into business and fails, another man is warned against following his methods. Then why should he not be rewarded for helping the other man?

The fact is we can not secure absolute justice in this world. No court of justice can trace out all the influences that come to bear upon our lives and fortunes. Our laws must operate in a practical way, and can only be framed to secure the greatest good to the greatest number.

In interference cases the reward must go to the first inventor. If we reward both inventors, then by analogy of reasoning we must reward the man who makes an invention ten or even twenty years after it has been invented and perhaps patented by another. Such a law would lead to unlimited confusion and would open the way to fraud.

It must be concluded that patents secure to inventors substantial justice as far as it lies in the province and domain of law to secure justice to the public in general in other lines of business. Our present laws seem to secure substantially the greatest good to the greatest number, consistent with the Constitution, the public welfare and common sense.

EUGENE L. ARNOTT.

Greenfield, Ohio.

An ordinary piano contains a mile of wire string.

Most of the land in the republic of Mexico is held in almost feudal tenure by about 7,000 families.

Berlin is the most cosmopolitan of large European cities. Only 37 per cent of its inhabitants are German by birth.

The ink used in printing the Bank of England notes was formerly made from grape stone charcoal, but now it is manufactured from naptha smoke.

Secret Inventions.

In the early working on arts and mechanics, workmen were put on oath never to reveal the process used in their manufacture. Doors were kept closed, artisans going out were searched, visitors were vigorously excluded from admission, and false operations blinded the workmen themselves. The mysteries of every craft were hedged in by quick-set fences of empirical pretension and judicial affirmation. There used to be, close by Temple Bar, in London, an old chemist's shop, the proprietor of which, in days gone by, enjoyed the monopoly of making citric acid. More favorably circumstanced than other secret manufacturers, his was a process that required no assistance. He employed no workmen. Experts came to sample and assort and bottle his products. They never entered the laboratory.

The mystic operations by which he grew rich were confined to himself. One day, having locked the doors and blinded the windows, sure, as usual, of the safety of his secret, our chemist went home to dinner. A chimney-sweep, or a boy disguised as such, wide awake in chemistry, was on the watch. Following the secret-keeper so far on his way to Charing Cross as to be sure he would not return that day, the sooty philosopher hied rapidly back to Temple Bar, ascended the low building, dropped down the flue, saw all he wanted and returned, carrying with him the mystery of making citric acid. The monopoly of the inventor was gone. A few months after the price was reduced by four-fifths. The poor man was heart-broken, and died shortly afterward, ignorant of the trick by which he had been victimized.

The manufacture of tinware in England originated in a stolen secret. Few readers need to be informed that tinware is simply thin sheet iron plated with tin by being dipped in the molten metal. In theory it is an easy matter to clean the surface of iron. Dip the iron into a bath of boiling tin and remove it, enveloped in the silvery metal, to a place of cooling. In practice, however, the process is one of the most difficult of arts. It was discovered in Holland and guarded from publicity with the utmost vigilance for nearly half a century. England tried to discover the secret in vain until James Sherman, a Cornish miner, crossed the channel, insinuated himself surreptitiously into a tin-plate manufactory, made himself master of the secret and brought it home.

The history of cast steel presents a curious instance of a manufacturing secret stealthily obtained under the cloak of an appeal to philanthropy. The main distinction between iron and steel, as most people know, is that the latter contains carbon. The one is converted into the other by being heated for a considerable time in contact with powdered charcoal in an iron box. Now steel thus made is unequal. The middle of a bar is more carbonized than the ends, and the surface more than the centre. It is, therefore, unreliable. Nevertheless, before the invention of cast steel there was nothing better. In 1760 there lived at Attercliffe, near Sheffield, a watchmaker named Huntsman. He became dissatisfied with the watchsprings in use, and set himself to the task of making them homogeneous. "If," thought he, "I can melt a piece of steel and cast it into an ingot, its composition should be the same throughout. He succeeded. His steel soon became famous. Huntsman's ingots for fine work were in universal demand. He did not call them cast steel.

That was his secret. About 1770 a large manufactory of this peculiar steel was established at Attercliffe. The process was wrapped in secrecy by everyone within reach. True and faithful men were hired, the work divided and sub-divided, large wages paid and stringent oaths administered. It did not avail. One midwinter's night, as the tall chimneys of the Attercliffe steel works belched forth, a traveller knocked at the gate. It was bitter cold, the snow fell fast and the wind howled across the moat. The stranger, apparently a plowman or agricultural laborer seeking shelter from the storm, awakened no suspicion. Scanning the wayfarer closely, and moved by motives of humanity, the foreman granted his request and let him in.

Feigning to be worn out with cold and fatigue, the poor fellow sank upon the floor and soon appeared to be asleep. That, however, was far from his intention. He closed his eyes apparently only. He saw workmen cut bars of steel into bits, place them in crucibles in a furnace. The fire was urged to its extreme power until the steel was melted. Clothed in wet rags to protect themselves from the heat, the workmen drew out the glowing mould. Mr. Huntsman's factory had nothing more to disclose. The making of cast steel had been discovered.

The casting of hollow ware was for a number of years a secret, and was kept in one family for more than fifty years.

The Cannibal Boa is Dead.

It is announced that the famous boa constrictor in the London Zoological Gardens, that swallowed his companion last October, is dead.

Shortly before the snake's death, the superintendent of the gardens wrote this account of the case:

Since January, 1894, the two fine specimens of the common boa lived together on friendly terms in one of the large compartments of the reptile-house.

The snakes are usually fed at dusk once a week, and, on the evening of October 5th, the keeper of the reptile-house placed two pigeons in the den of the two boa-constrictors. The larger one seized one of the pigeons and no doubt swallowed it, after which the keeper closed the house and left. On his return the next morning he was astonished to find only one boa in the compartment instead of two, and from the enormously increased size of the remaining one he concluded at once that the larger boa had swallowed its companion. That this was so was evident to all who visited the house.

The enormous enlargement of the creature's body was most remarkable. It had no longer the power of curling itself round, as snakes usually do, but remained extended nearly its full length in a straight line, and appeared to be at least three times its normal size in circumference. It was almost painful to see the distended skin, which had separated the scales all over the middle of the body. After examining the snake, my expectation was that it would ultimately disgorge its companion. I have, however, been disappointed. Recalling to mind a former and very similar case, in which the decomposing body of the snake swallowed caused the death of its destroyer, I had much doubt about the digestive powers of this animal. But in the present instance the snake has not only digested his companion, but has regained its appetite as well as its normal size.

On Friday, November 2d, the keeper, finding the creature moving about as if in search of food, placed a pigeon in its den, which was seized and swallowed immediately. I have had this voracious serpent measured, and find it to be eleven feet in length.

A careful examination of the evidence in the case made one theory appear probable. This was that one snake had had a pigeon in its mouth, and that the other had seized it, perhaps playfully. When a snake has closed its jaws on a large object he cannot relinquish it, owing to the fact that his numerous teeth slant backward and that the jaws are distended. In this case the bigger snake, it would appear, was absolutely compelled to swallow the smaller.

The Bicycle a Miracle.

It seems absolutely impossible that a wheel 30 inches in diameter, with a wood rim and wire spokes, so light that the whole structure only weighs twenty ounces, should sustain without permanent distortion the weight of four men standing on its side, with supports at four points only under the rim and no hub support whatever.

It also seems incredible that a cycle capable of carrying a man of 150 to 195 pound in weight can be made so light that the whole structure weighs less less than nine pounds. Yet this has been done. Even at the roadster weight of 23 or 24 pounds, the the cycle carries a greater load with safety than has ever been put on any other vehicle.

The influence of the cycle on social life is already great and will probably constantly extend as it provides an outdoor sport and amusement for women, which did not previously exist in any form in America. American women are not walkers, but the cycle is perhaps even better suited to woman's use than to man's and seems destined to add an outdoor element to the life of woman the world over which was not possible without the winged wheel."

The miracle of the bicycle lies in its birth, death and resurrection; in its incredible load-bearing power in proportion to weight; in its displacement of the horse as a means of its mechanical details of compressed air support, tubular framing and chain driving.

All of these are details often before introduced into machines, but never before permanently retained. That these cast-offs are undeniably power savers is convincingly proved by their continued use under human muscle driving power.

Finally the one great achievement of the bicycle is to increase the human power of locomotion so that the slowfooted man is made one of the swiftest of all running creatures.—Engineering Magazine.

A London inventor has a bicycle suit for women that is convertible, by means of a strap, into an ordinary costume at the pleasure of the wearer.

Electric Mail Carrier.

A Chicago inventor has devised a mail-carrying arrangement which has favorable impressed the postal authorities, and if successful will do away with the lumbering mail wagons in city streets, as mail will be carried on trolley cars running on wire cables strung over the roofs of houses. A test will be made in Chicago at an early day, the city council having granted the inventor permission to string his wires. The cost of construction is put at $250 a mile. A description of the motor and carrier by the inventor is as follows: "The whole arrangement weighs 32 pounds. The motor alone weighs 18 pounds and its strength is one-fourth horse-power as proved by actual tests. It will be operated by a single wire without a return circuit. All parts of the carrier except the motors are made of aluminum. The cars are detachable from the frame, and can be taken out and changed in ten seconds. The motors will climb an incline of 20 per cent. The speed is regulated before the carrier is started on its trip by a simple attachment. It will run no faster down grade than up. It cannot jump off the wire even at a speed of 100 miles an hour. It runs on a four-inch sheave wheel with deep flanges. The wheel is furnished with ball bearings. The power required to operate the carriers at a speed of 60 miles an hour is exactly the same as is required to ruu an ordinary arc light. A current of 110 volts is used. A heavier cable is used than is necessary to sustain the weight as a measure of safety."

Electric Flash Light.

An interesting application of photography was recently made at the Metropolitan Opera House in New York, a photograph of the vast audience assembled to hear Alvary's 100th performance of the title role of Siegfried being taken by flash light. This was the largest photograph ever taken by a flash light and proved to be a complete success. Electricity played an all-important part on this occasion, for by its means 35 piles of magnesium powder were simultaneously exploded, making one gigantic flash lasting less than one-fortieth of a second.

Many attempts have been made to obtain photographs of large interiors and groups of people. Very little success has attended these efforts, owing to the difficulty of obtaining an intensely brilliant light in the shortest possible space of time. So well were the many obstacles overcome in the photograph of the Metropolitan Opera House that not the slightest movement can be noticed in the audience of 3,500 people.—*Electrical World.*

The "Age" Deserving of Credit.

RENIFF, N. Y., June 17th 1895.

EDITORS INVENTIVE AGE: You are deserving of great credit for the warnings you are giving to inventors against the sharks who would sell patents on commission *providing they can get an advance fee of a few dollars.* The first intimation I had that my patent had been published was in receiving a letter from such a firm. This has been followed by scores of others all offering to sell for a small per cent on commission *if the fool's money is paid first.* The very great probability is that none of them are making a business of selling patents. It is doubtful if some of them have a desk even at the address given. Their worthless reccommendations are about the size of their stock. One firm that I made an investigation of their affairs through a very reliable business man who sent me a letter from one of the officers of the bank, gave them no standing at all. Any one with common sense knows that it is impossible to travel over the territory a patent covers and sell a patent worth from $3,000 to $5,000 for ten per cent. Offer any of them twenty-five per cent without an advance fee and you provoke their ire at once. The P. O. D. should refuse them theuse of the mails to carry on their fraudulent business.

J. H. ANDRE.

Henry Snyder, of Urichsville, is having cast at Steubenville an invention which will prevent the boxes on car-wheels from becoming heated by friction. It consists of an application of oil to the journals.

Our First Real Battle-Ship.

The second-class battle-ship Maine, now being built at the Brooklyn Navy Yard, will be completed and put into commission about August 1. This ship will have the distinction of being the first battle-ship commissioned by the United States Navy. The building of the Maine was authorized by act of Congress on March 3, 1887. An appropriation of $2,500,000 was made to cover the cost of the hull and machinery, which amount was not to be exceeded. In 1888 her keel was laid in the Brooklyn Navy Yard and work has been in progress ever since. Her principal dimensions are: Length on the water line, 318 feet; breadth, 57 feet: mean draft, 21 feet 6 inches; displacement, 6.648 tons. The engines, four in number, were built by the Quintard Iron Works of New York city, weigh some 890 tons, and are of the twin-screw vertical triple expansion type. The cylinders are 35 1-2, 57 and 88 inches in diameter, and have a stroke of 36 inches. The indicated horse power of the engines is 9,000, and the engines took two and one-half years to build. Her speed per hour is 17 knots, and her normal coal capacity is 400 tons, while the total coal capacity of the bunkers is 896 tons.

The main battery consists of four 10-inch and six 6-inch breech-loading rifles. The secondary battery contains eight six pound rapid firers, eight one-pound rapid firers and four Gatling guns. On the main deck there are two turrets, one placed aft on the port side and the other forward on the starboard side. These turrets are both mounted on barbettes running down to the protective deck.

The vessel is heavily protected from the guns of an enemy by side armor, twelve inches thick. This armor is placed on both sides of the vessel, and is about 200 feet long and seven feet board. This protects the engines boilers magazines, and in fact all the vulnerable part of the ship. The turrets are protected by eight-men armor, and the barbettes have plates twelve inches thick. There are five decks—the platform deck, the protective, the berth, the main and the superstructure. The protective deck is guarded by means of two inch plate armor.

The guns are mounted as follows: Two of the 10-inch guns are placed in each turret, where they are so mounted that they can be trained to fire within an arc of 288 degrees. Four of the six 6-inch guns are mounted on the main deck, two in the bow, and two in the stern. The other two are mounted on the middle of the superstructure deck, one to port and one starboard. The eight six pounders are divided up with six on the main deck and two on the bridge. Six of the eight one pounders are mounted on the main deck, and one in the fighting top on each mast. Of the four Gatlings, twe are mounted on the superstructure deck and one in each fighting top.

On her superstructure deck she will carry altogether thirteen boats. Of these, two are torpedo boats, two are steam launches, and the balance are ordinary barges and gigs. The two torpedo boats, however, are an important addition to her armament and deserve special consideration. They weigh about 29,000 pounds each, are 62 feet 6 inches long, and have 9 feet 3 inches beam They are intended to have a speed of about twenty knots per hour, but as they have not as yet had their trial trip, their speed is problematical, although they are expected to even exceed that requirement. Each boat is driven by a quadruple expansion engine, and will carry torpedo tubes in its bow. Although outside their torpedoes, they are not intended as vessels of offense, each of them carries a one pounder on a swivel which can be used with great effect, in case an attempt is made to capture them by boats. Although their weight runs up to so high a figure, it is mainly due to the engines and boilers, which are of the finest make, and are needed for the development of the high speed necessary to their usefulness. The inside shell of these boats is only 3-32 of an inch thick and so thin, that a ball from an ordinary pistol would have no difficulty in piercing the sides. In action a crew to run one of these boats would consist of five men; an officer in charge, an engineer, fireman, and two men to launch the torpedoes. It is generally conceded by experts that these two boats are even more to be feared than the Maine's

In October, 1894 the Maine was given her trial trip on Long Island sound, with gratifying results. With a mean draft of 18 feet 4 inches, she made 18,37 knots per hour, and in every way fulfilled the expectations of those in charge of her building. She did not have her heavy guns no board, nor her ammunition and stores, which would make her draw 21 feet 6 inches of water, as estimated in the original plans. This difference in weight would not make at the utmost more than a knot difference in her speed. Her speed when in commission can now be estimated as 17,37 knots, a small increase over over the 17 knots as originally intended.

The Canadian Soo Canal Opened.

The Canadian Soo Canal was formally opened on the 13th ult. The canal will not have an available draft at present of more than fourteen feet, on account of boulders in the channel. It will take a month yet to remove these obstructions. The contracts for the canal and lift locks were let in November, 1888, and those for the entrance works in January, 1889. Water was first admitted to the locks Sept. 5, 1894. The total length of the canal, across St. Mary's Island, is 4,000 feet, or from eastern to western extremities of the piers about 8,000 feet. With the approaches, the distance is about three and one-half miles. The lock chamber is 900 feet long, 60 feet wide, with a depth of water sufficient to pass vessels of twenty feet draught at the lowest recorded stage of water below the lock. The lock fills in nine minutes, and can be emptied in seven and a half minutes. The canal proper has a surface width at low water of 152 feet and a bottom width of 145 feet. At a point about 1500 feet above the lock it is crossed by a swing bridge, over which the railway systems of Canada and the United States find accommodation. The works altogether cost $4,000,000.

The Mightiest Engineers.

One of the marine wonders of the world is the great Barrier Reef of Australia. The stupendous rampart of coral, stretching in an almost unbroken line for 1250 miles along the northeastern coast of Australia, presents features of interest which are not to be equaled in any other quarter of the globe. Nowhere is the action of the little marine insect, which builds up with untiring industry those mighty mountains with which the tropical seas are studded, more apparent.

By a simple process of secretion there has been reared in the course of countless centuries an adamantine wall against which the billows of the Pacific, sweeping along in an uninterrupted course of several thousand miles, dash themselves in in ineffectual fury. Inclosed within the range of its projecting arms is a calm inland sea, dotted with a multitude of coral islets, and presenting at every turn objects of interest alike to the unlearned traveler and the man of science.

Here may be witnessed the process by which the wavy gelatinous mass hardens into stone, then serves as a collecting ground for the flotsam and jetsam of the ocean, and ultimately develops into an island covered with a luxuriant mass of tropical growth. Here again may be seen in the serene depths of placid pools extraordinary forms of marine life, aglow with the most brilliant colors, and producing in their infinite variety a bewildering sense of the vastness of the life of the ocean.

Mechanics head the list of inventors.

* * *

A London man has invented a nursery tricycle. It contains two seats, one for the maid and her charge and has two pairs of pedals.

* * *

Paris has 86,150 horses, of which 15,084 belong to the Omnibus Company and 11,117 to the cab companies. From 16,000 to 17,000 horses a year are slaughtered for food.

* * *

Thorneycroft's latest torpedo boat destroyer for the British Government, "The Bruiser," made an average of 28.114 knots in six runs over the measured mile in very bad weather. In the three hours' trial the mean speed attained was 27.97 knots.

* * *

In Italy, one of the first countries to take up cremation as a substitute for burial, the number of crematories in 1894 was 23; and that of bodies cremated, 2509. Though the membership of the cremation societies increases steadily, progress is not very rapid owing to the hostility of the Church.

* * *

A machinist who dropped into our office the other day and was asked how he was getting along with the new machine he has invented and is trying to develop, says the American machinist, replied that he was troubled with a drunken capitalist and was making no headway whatever. He explained that a wealthy man, who had agreed to put up the money for an experimental plant, had been on a prolonged spree which seemed likely to be continued indefinitely, and things were in such shape that nothing could be done. It is evident that there should be a general agreement amongst mechanics not to employ drunken capitalists.

* * *

Negotiations are reported in progress for the organization of "an excelsior trust, composing thirty manufacturers, operating chiefly in Wisconsin, Iowa, Illinois, Indiana, Ohio and Michigan."

The "Claims" of Inventors.

In our country, says "*Brick*," the inventor in his application for patent, must fully describe his invention; and define in particular words the substance of what matter he wishes to secure to his own use or monopoly. This last is what is known as "the claim," and there is not a more abused thing in the long list of abuses, than the "claim." It is the rock upon which the ignorant and careless founder and inventor and attorney alike have in this small portion of the specification sown more seed of error, litigation, and failure than in anything else they have to do with.

Claims should be commensurate with the subject of invention. If they are broader than the invention shown, the patent is invalid. If narrower than the true state of the art would properly admit of, the inventor has resigned to the public use some of his interest and right. In other words, the protection afforded by the letter patent is coextensive with the valid claims.

A common error in elaborating the claim is one known as a "functional claim." That is, the claim describes a function and not the mechanism of the invention. This is easily shown by an illustration.

Functional claim:—The combination with a measure, of a registering device so arranged that the passage of the striker over the measure will operate the register, substantially as described.

Properly amended:—The combination with the portable or hand grain measure, of the alarm mechanism which is adapted thereto and a tappet which is operatively connected with said registering device and arranged substantially as shown and described so that in passing over the measure, the striker will operate said device, by contact with the tappet as specified.

These are claims taken from an actual specification, and define the subtle difference between a functional claim telling how certain things are done and a claim defining the mechanism ior accomplishing the desired end.

The claim carefully drawn, should cut direct at at the principle or essence of the invention, and while describing it clearly should use no more detail in doing this than is necessary from the prior state of the art. In many cases detail draws closer the limits of the claim and in describing so closely the construction, the true genius of the invention is lost and renounced. As has often been said, "give us a good drawing and a good claim, and we care very little what else there is in the specification." That is, showing all the invention in the formal drawing and covering it with a careful claim, the inventor has secured what can be made into a valuable patent.

The Harlem Ship Canal.

Its dry but telling details are 550,000 tons of rock removed; 162,000 cubic yards of earth excavated; 1,000,000 cubic yards of earth and mud dredged; 5,000 cubic yards of retaining walls built; 2,000,000 pounds of dynamite exploded. Not a single life has been lost, and but a few men injured, though flood, tempest and other untoward circumstances have surrounded the enterprise. Nine hundred and thirty thousand dollars have thus far been paid out.

Maxim, the Maine Inventor.

Maxim, the Maine inventor, has made a gun for the Sultan of Turkey which fires 770 shots a minute. It is a light field piece. But his cavalry gun, firing 700 shots a minute, which may be carried strapped to a soldier's back weighs but thirty pounds. Think of a regiment in action, each soldier working off his 700 shots a minute, supported by a thousand field pieces of the seven-hundred-and-seventy shots a minute variety! Such showers as these will characterize the battles of the future. They will be short, sharp and decisive for both sides.

LOW RATES TO BOSTON.

The Christian Endeavor, United Society of the National Young People's Union meets in Boston July 10 to 14.

For this occasion the B. & O. R. R. will sell excursion tickets from all points on its lines east of the Ohio River, July 8 to 11 inclusive, valid for return passage until July 31. These tickets will be sold at rates of one for the round trip going and returning same route. Tickets will also be placed on sale good going via one route and returning via another, at at slightly advanced rate.

For rates of fare and full particulars, call on or address nearest B. & O. Agent.

Advertisements inserted in this column for 20 cents a line (about 7 words) each insertion. Every new subscriber sending $1.00 to THE INVENTIVE AGE will be entitled to the AGE one year and to five lines three times FREE. Additional lines or insertions at regular rates.

FOR SALE.—Patent No. 512 629. Rocking Churn. I have sold the right to three western states for $7,000; will take $5,000 for remainder of U. S. Large profit for manufacturers. For full particulars, address, Col. G. H. Smith, Webster, W. Va. 6-8

FOR SALE.—I, the undersigned, will receive bids on my Saw-file Guide, [Pat. No. 537,827, issued April 23, 1895,] until July 25, 1895, when they will be opened and awarded to the highest bidder. Respectfully, Aug. Kaempfer 1316 Center St., Sheboygan, Wis. 5-7

FOR SALE.—Patent issued April 30th, 1895; a regular gold mine for somebody. It is a flax thresher and can be attached to a common harvester; it will thresh and clean the flax at the same time as cut, with one operation. It has been tested and is a complete success. Will sell or let it be manufactured on royalty. For full particulars, address, T. O. Helgerson, Volga, South Dakota. 6-8

FOR SALE.—Patent No. 535,337, Rotary Engine; issued March 5, 1895. Simple in construction and mode of working. Inexpensive to manufacture. Correspondence solicited. Address, Joseph West, Galveston, Texas. 5-7

FOR SALE.—Patent No. 536,653; Non-defacing Shade Roller Bracket; no screws, no nails, quickly fastened. $5,000 or make royalty offer. Also Canadian and English patents. Clinton W. Raker, 37 W. Sunbury St., Shamokin, Pa. 6-8

FOR SALE.—Patent No. 493,115; Time Lock. Will sell state rights or United States at reasonable prices. Lock can be applied to any common safe door. Locks for five minutes or for seven days. For any information address N. B. Reis, Lincoln, Kans. 4-7

FOR SALE.—Patent No. 492,016; Potato Digger and Screen combined. Will sell at a reasonable figure. Address, E. A. Hoffman, Del Norte, Col. 6-5

FOR SALE.—Something good—Mowing Machine Knife Bar. This bar is so arranged as to hold the knives and Pitman eye with one bolt. For particulars address Z. E. Wiseman, Vadis, Lewis Co., W. Va. 4-7

FOR SALE.—A valuable patent on corn planting machinery, No. 527,160. Fits nearly all planters. Splendid to work by agents. Will sell or place on royalty with bonus. Address quickly, Leroy Runyan, Iola, Kans. 4-7

FOR SALE.—Patent No. 535,337; Rotary Engine; issued March 5, 1895. Simple in construction and mode of working. Inexpensive to manufacture. Correspondence solicited. Address, Joseph West, Galveston, Texas.

FOR SALE.—Or on royalty patent No. 532,151, Door Prop or Bolt. Holds the door open at any point and will bolt it when shut. Also best bosom board made. L. Funk, Waynesburg, Pa. 4-3

FOR SALE.—Or trade, patent No. 477,246, Washing Machine. Has stood practical use. Am not able to give it attention on account of poor health. A bonanza for right party. T. D. C., Box 43, Boyleston, Ind. 4-7

FOR SALE.—One-half interest of territorial rights of patent No. 432,592. A device for dressing or cutting mill stones. Address, Simon P. Bacaston, Sand Beach, Pa. 4-7

FOR SALE.—Patent No. 454,254, on toy belonging to the "puzzle" family. A fine opportunity for some person or novelty manufacturer. Only $200 and royalty if taken at once. Max Cohn, 828 Vliet St., Milwaukee, Wis. 6-8

FOR SALE.—Patent No. 525,225; Gravity Door Lock. Has no springs. Easy working, cheapest and most durable. Address, B. S. Miles, Gray Summit, Mo. 2-7

FOR SALE.—Patent No. 553,472. A device for tallowing culinary vessels for cooking purposes. Will sell on a royalty. Address, M. Krakty, Hemingford P. O., Nebr. 7-9

FOR SALE.—Patent No. 512,096. Derrick Hay Loader. Does away with cart. Puts whole cock of hay in a desired position or height on wagon with grappling fork. Address, W. C. Card Meade, Mich. 7-9

"BUBIER'S POPULAR ELECTRICIAN" is the name of a monthly publication which contains a vast amount of valuable i..formation on all electrical subjects. Its department of "Questions and Answers" will be appreciated by students and amateurs desiring information or instruction on any problem that may arise. THE INVENTIVE AGE has made special arrangement whereby we can supply that popular dollar journal and THE INVENTIVE AGE—both publications one year—for $1.50.

BUSINESS SPECIALS.

Advertisements under this heading 20 cents a line each insertion—seven words to the line. Parties desiring to purchase valuable patents or wanting to manufacture patented articles will find this a valuable advertising medium.

WANTED.—Manufacturers or capitalists who which to pay all expenses for an interest in the patent of a bicycle Motor to be patented. Address, Sam Taylor, P. O. Box 173, Houston, Tex. 6-6

WANTED.—Some articles to manufacture that will pay thirty per cent on the investment and will not require over five thousand dollars to put on the market. Address, S. Z. Starr, Drawer U, Indianapolis, Ind. 4-7

WANTED.—To hear from parties with capital, interested in developing a valuable invention of merit. For further particulars address George C. Stanton, New Iberia, La. 5tf

WANTED.—Manufacturers or capitalist who wish to pay all expenses for an interest in the patent for a meritorious invention to be patented. Address, George C. Stanton, New Iberia, La. Correspondence solicited. 3tf

WANTED.—To manufacture on royalty, household inventions Send specifications and if models are sent prepay all charges. Galpin & Hanley, Binghamton, N. Y. 6-8

R. U. asleep? Listen! We'll pay U $5 for every new student, who pays entire tuition in advance, Milwaukee Correspondence School of Practical Bookkeeping, 828 Vliet St., Milwaukee, Wis. (13 years practical experience.) 6-9

Electric.

It is said that electricity has been called into play for fishing purposes. A lamp in the shape of a fish is lowered and attracts the finny tribe. It is swallowed and then the fun begins. The current is turned on, the fish becomes unconscious and is easily captured!

We acknowledge the receipt of a copy of an interesting treatise on the Steam Separator, written by Mr. Charles D. Mosher, of New York. This little work will be sent free to the address of anyone wanting it. Every engineer should have it. Address Chas. D. Mosher, No. 1 Broadway, New York.

President Collier, of the Atlanta Exposition, has closed a contract with H. R. Worthington & Co., of New York, for the pumps to supply the electric fountain at the Cotton States and International Exhibition. The capacity of the pumps is 40,000,000 gallons in twenty-four hours, or double the canacity of the Atlanta water-works pumps. Worthington & Co. will make, in connection with this, an exhibit covering 3,000 square feet. The electric fountain is designed by Mr. Luther Stieringer, who is consulting electrical engineer for this Exposition, as he was for the World's Fair.

In view of the fact that the Intramural Road, at the World's Fair, operated on the third rail method, carried nearly 6,000,000 paying passengers with perfect safety and success, we need not wonder at the rapid adoption of the system for one of the permanent elevated roads in Chicago. Now that Chicago and Liverpool are thus equipped for rapid transit, New York can well afford to fall in line. It is no mere novelty that appeals to her timid conservatism, but a tried and proved advance in the arts. The continued use of steam on the elevated roads is an anachronism that has not even economy to excuse it.

With reference to electrical fakers in general and one in particular, the *Worcester Spy* very sensibly says that when a man claims to get out of any mechanical device more than he puts into it, it is time to suspect either his sanity or his honesty. A correspondent of an electrical contemporary calls attention to a stock-selling speculation loudly advertised in a Boston daily paper, which has a very queer look about it. The promoters say that "the voltage distributor is a machine that multiplies electric horsepower without materially increasing the cost of the original source of production." Any Worcester capitalist contemplating investing in any such scheme had better in the first place consult with a junior member of the electrical course at the Polytechnic Institute.

A correspondent writes to the London *Electrical Engineer* as follows:

The other day a friend of mine who is a jeweler asked me jokingly whether I could rig up an electric shock-producing device for testing diamonds and the detection of sham or paste diamonds. After thinking the matter over, I presented him, a couple of weeks later, with the following apparatus, to his entire satisfaction: To the spindle of a small electric motor is attached a small thin disc made of aluminium and placed in a horizontal position. A clamp with a small flat spring, and provided with an adjustable screw holds fast a ring or any other article with the real or sham "brilliant." The ring, etc., is moistened, and slowly moved by hand towards the disc, driven at high speed by the motor, thus applying, so to speak, a brake to the motion of the disc. The idea is based on the fact that if a sharp piece of aluminum be rubbed on moistened glass, brilliant metallic markings result on the glass diamonds but not on those which are genuine. If some metallic marks are found on the so-called diamond, then, of course, it is not a genuine article; otherwise, it is a real diamond of the first water.

THE INVENTIVE AGE can recommend the "Climax" watch, advertised in another column, as being, undoubtedly, the best stem-winder watch for the price in the market. It is a good time keeper, and either a plain or imitation engraved cases can be had. This watch is fully timed and regulated and fully guaranteed for one year, the same as Waltham or Elgin.

Aftermath.

CHAS. P. LIBBY the great packer, died in Chicago, on the 24th ult.

A general advance of 10 per cent has been made in wages by the Cleveland Rolling Mill Company.

THE Pioneer Mining Company of Birmingham, Ala., recently raised the wages of 700 miners ten per cent.

THE old price of $24 per ton for steel rails is likely soon to be restored. In January last the price was reduced from $24 to $22.

THE sixty-ninth meeting of the American Institute of Mining Engineers will be held at Atlanta, Ga., beginning October 8, 1895.

IT is reported that Mr. Charles T. Yerkes, and his immediate friends have secured the controlling interest in the Siemens and Halske Electric Company of America.

THE success of electricity as motive force for elevated street car system has been thoroughly demonstrated in Chicago, and now it is announced that the Metropolitan Company of New York will substitute electricity for steam.

THE Washington and Great Falls Electric Company has secured permission to issue $500,000 in bonds to build its road. The line is about 6½ miles long and the trolley system will be used.

AN advance of 10 per cent in the wages of the employees of Eferhard Manufacturing Company, Cleveland, is announced; also same per cent of raise in the National Malleable Castings Company.

THE following are the officers of the General Electric Company, chosen at the meeting of June 12: C. A. Coffin, President; Eugene Griffin, first vice-president; J. P. Ord, second vice; E. W. Rice, Jr., third vice; H. W. Darling, treasurer; C. G. Smedberg, assistant treasurer; M. F. Westover, secretary.

IN the suit of the Westinghouse Company against the General Electric Company, for infringement of the Tesla multiphase patents, Judge Townsend of the U. S. Circuit Court at Hartford, Connecticut, has handed down an order requiring the General Electric Company, to complete its proofs by October 7 next.

AN increase of wages of from 5 to 15 per cent has been voluntarily made by the St. Louis Shovel Co.; Warren Foundry and Machine Co.; Phillipsburg, N. J.; Turner, Vaughn & Taylor, Cuyahoga Falls, O.; Rolling Mill Co.; Howard Harrison Iron Co., Bessemer, Ala.; Bethlehem, Pa., Iron Co.; Crane Co., Chicago; the above are only a few. During the past month over 1,000 firms in the country have voluntarily advanced the wages of their employees.

DR. WELLINGTON ADAMS, head of the electric railway to be run from St. Louis to Chicago, says: "We have been detained in the construction of our road by the panic of the last two years and were hitherto unable to place bonds. We hear from our bankers in Chicago, who were to place the bonds, that they now have $9,000,000 raised, leaving only $1,000,000 to be raised. These are under a constant monthly forfeiture and this will cause them to expedite matters as much as possible. I am very confident that we will soon resume work."

A Valuable Work.

To make the study of mechanical appliances popular as well as thorough should be the aim of all those who desire to advance the industrial interests of our country.

Mr. Jno. T. Mosher has compiled a practical treatise on modern machine shop methods, entitled "The Modern Machinist," which is a welcome contribution to the literature of the mechanical world.

It embraces comprehensive descriptions of the methods employed in prominent machine shops in this and the old country, and abounds in illustrations, which are given in perspective instead of in the projectional diagrams hitherto used. As the lathe is considered the most important of metal-cutting tools, a large part of the book is devoted to this branch of machine work. We bespeak a great demand for the book.

Published by Norman W. Henley & Co., 132 Nassau St., N. Y. $2.50.

What a Woman Can Do!

I want my lady friends to know of the new field now open for them. In the past six months we have made a profit of $907.02 after paying all expenses. All our sales have been made at home, not having canvassed any. My official duties calling me away most of the time, I left the Dish Washer business in my wife's control with the above results. The business is rapidly increasing and will continue to grow until every family has a Climax Dish Washer. Not a day passes but what we sell one or two, and some days fifteen or twenty Dish Washers. It's easy selling what everybody wants to buy. You can wash and dry the dishes perfectly in two minutes. For full particulars, address the Climax Manufacturing Company, Columbus, Ohio. Get a sample washer and you can't help but make money. They only cost $5. You may just as well be making $5 a day as to be doing nothing.

INVENTIVE AGE BUILDING.

PREMIUMS TO SUBSCRIBERS.

Read the following offers to new subscribers:

OUR $1 OFFER.

THE INVENTIVE AGE one year and two copies of any patent desired, or one copy of any two patents..... $1 00

THE INVENTIVE AGE one year and a list of 50 firms who manufacture and sell patented articles..... 1 00

THE INVENTIVE AGE one year and Altograph map of the City of Washington 1 00

THE INVENTIVE ACE one year and a five line (35 words), advertisement in our "Patents For Sale," or "Want" column, three times..... 1 00

For $1.

THE INVENTIVE AGE and any one of the following Scientific books:

How to Make Electric Batteries at Home, fully illustrated, by Edward Trevert.

Everybody's Handbook of Electricity, illustrated, by Trevert.

How to Make a Dynamo, by Trevert.

Practical Directions for Electric Bell Fitting and Electric Gas Lighting, by Trevert.

Elihu Thompson's What is Electricity?

OUR $1.35 OFFER.

THE INVENTIVE AGE one year and Joseph Allen Minturn's famous book "The Inventor's Friend," indorsed by such high authorities, as Dr. Gatling, Clem Studebaker and others,.....$1.35
Book alone 50 cents.

THE INVENTIVE AGE one year and any one of the popular and instructive books as per offer in another column, under heading of "Popular Scientific Books."..... $1.35

THE INVENTIVE AGE one year and any one of the "Excelsior Edition of Standard Poets," mentioned elsewhere in this magazine..... $1.35

THE INVENTIVE AGE one year and a copy of "Picturesque Washington," 260 pp., 136 illustrations, Stilson Hutchins' famous book, former price $2, sent to any address in the United States..... $1 35

THE INVENTIVE AGE one year and The Peoples' Atlas of the World, one of greatest bargains ever heard of; size of Atlas 14 x 22 open; latest maps and statistics; handsomely illustrated, a $2 book with AGE one year—both for.... $1 35

☞ See another column for other offers.

OUR $1.50 OFFER.

THE INVENTIVE AGE one year and Robt. Grimshaw's famous book "Tips to Inventors"..... $1 50

Address all communications to
THE INVENTIVE AGE,
Washington, D. C.

Cantwell & Company, Patent Agents, Calcutta, India.

We have received from this well-known and long established firm in the east their handy little phamphlet which deals fully with the laws and regulations appertaining to the taking out of Patents and registering of Trade Marks in India and other Eastern countries. It will be found a very useful adjunct to the file of Patent Agents in this country and more so to those in this city, the headquarters of the fraternity. The manual contains a list of charges which we think are very moderate, and, which will we feel sure fill a long felt want in that direction.

A junior member and representative of the firm, Mr. Harry Cantwell, is at present in this city which he proposes to make a permanent residence.

All communications to him with reference to any information regarding Patent Practice in the East may be directed in care of the Inventive Age office, Washington. We may add that the above firm are the sole agents for the "Inventive Age" in India, British Burmah and Ceylon.

Want a Fountain Pen?

One of the very best in the market, a standard article, warranted, will be sent as a premium with THE INVENTIVE AGE. The retail price of the pen is $2.75. We will sendthe AGE one year and the pen for $2.75.

SUPPLEMENT.--Tips to Inventors.

The Infancy of Invention.

As capital is constantly being invested and expended to protect and preserve capital previously expended and invested in various enterprises all over the land, so will inventions continue—their variety and multiplicity being demanded to further the usefulness and perfection of inventions previously originated.

It was Edison who, replying to the question, "Do you think that the inventions of the next fifty years will be equal to those of the last?" said: "I see no reason why they should not. It seems to me that we are at the beginning of inventions." The truth of this prediction is illustrated in the many useful and wonderful achievements of Mr. Edison's own laboratory since giving utterance to this statement only a short time ago.

Profits from Invention.

The value of an invention is determined by no fixed rule. Fabulous sums have been made from simple and novel, as well as complex and useful, inventions. It is a fact that four-fifths of the business of the United States is transacted by the use of inventions. The benefits to mankind because of inventions, are so manifest and so common we are apt to look upon them in a matter-of-fact sort of way and fail to give the inventor the credit due him. In the majority of cases, however, the failure of an inventor to reap a reward is attributable to his own negligence, lack of forethought and indiscretion.

Nearly every human being is an inventor, but only a few obtain a *monopoly*—a patent—on the product of their brain. There are thousands of really useful articles, appliances and discoveries, in use every day by millions in all walks of life, that might have been patented had the inventor possessed the business sagacity that has actuated his more fortunate neighbor. Take for instance the open slot necessarily used in all conduit electric, or cable street railway systems. The inventor failed to get a patent on the idea and a fortune missed him.

There is money in inventions, but not always for the inventor.

The only way to make money out of an invention is through the protection afforded by a patent; not a patent in name only, but a *good patent*—one that is intelligently drawn, with claims commensurate with the scope and importance of the invention.

The profits arising from inventions in the electric field during the past twelve years have been simply astounding. In railway appliances, bicycles, typewriters, telephones, cash registers, slot machines and farm machinery, the field has been equally remunerative. And just think of that simple toy "Pigs in the Clover"—it netted the inventor, whose friends laughed at him for obtaining a patent on so simple a toy, over $150,000. The inventor of the metal plates to be attached to the worn heels of shoes (for sale in all cities) realized a fortune out of it amounting, it is said, to nearly $1,000,000. Perforated wooden seats for chairs and rubber tips for lead pencils brought the inventors big results. Howe made a million dollars from his sewing machine attachments, and the inventor of that simple lamp attachment, the inverted glass bell, to be suspended over lamps to protect the ceilings from being blackened, made the inventor rich. The "Darning Weaver," a device for repairing stockings, is a useful invention and is netting the inventor a handsome revenue on royalties. The wire nail and gimlet-pointed screw are fortune makers, and wire nails caused the invention of automatic machinery that manufacturers them so cheaply it does not now pay the carpenter to spend his time in picking a nail up when it drops, if it requires ten seconds to do so. The inventor of the well-known "safety pin" lived in luxury all his life, after discovering a means of concealing the point of a pin in such manner as to prevent scratching. The inventor of roller skates made nearly a million and the inventor of the needle-threader for a long time made $10,000 a year.

Relation of Capital to Invention.

Mr. Edward P. Thompson, one of the most entertaining writers on the subject of invention, says that "every invention, before the introduction into practical use, passes through two stages; namely, mental and physical"—mental when in the mind of the inventor only, and physical when the mental invention is put into bodily form by hand, or by hand with the assistance of a convenient tool. "A mental invention," says the writer, "sometimes does not become a physical invention because the inventor lacks money, technical knowledge or diligence. Such a mental invention often becomes a physical invention by the assistance of a capitalist, an educated person, or diligent companion." This being true the *mental* inventor, the person who, for lack of means possibly, would fail to make his invention a physical reality—such a person should take into his confidence a friend or companion to share the prospective benefits of his invention. Thousands of meritorious mental inventions are never worked out because of the over-timidity of the inventor, his exagerated greed for *all* the benefits to accrue instead of half the loaf, which in many instances is, or would have been, ample reward. Mr. Thompson truly says: "Inventors and capitalists should be more willing to co-operate. It is too often the case that the former must pay for his own experiments and all patent costs before a capitalist will even take the trouble to look into the merits of the alleged invention. On the other hand it is too often true that the capitalist seeks to join with the inventor, but the latter wants too high a price at the beginning."

Who Can Apply for Patents.

Patents are issued to any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or new and useful improvement thereof, not known or used by others in this country, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned; and by any person who, by his own industry, genius, efforts and expense has invented and produced any new and original design for a manufacture; any new and original design for the printing of fabrics; any new and original impression, ornament, pattern, print or picture to be printed, painted, cast, or otherwise placed on or marked into any article of manufacture, or any new, useful and original shape or configuration of any article of manufacture, the same not having been known or used by others before his invention or production thereof, nor patented or described in any printed publication, upon payment of the fees required by law and other due proceedings had.

If it appears that the inventor, at the time of making his application, believed himself to be the first inventor or discoverer, a patent will not be refused on account of the invention or discovery, or any part thereof, having been known or used in any foreign country before his invention or discovery thereof, if it had not been before patented or described in any printed publication.

Joint inventors are entitled to a joint patent; neither can claim one separately. Independent inventors of distinct and independent improvements in the same machine can not obtain a joint patent for their separate inventions; nor does the fact that one furnishes the capital and another makes the invention entitle them to make application as joint inventors, but in such case they may become joint patentees. The receipt of letters patent from a foreign government will not prevent the inventor from obtaining a patent in the United States, unless the invention shall have been introduced into public use in the United States more than two years prior to the application. But every patent granted for an invention which has been previously patented by the same inventor in a foreign country will be so limited as to expire at the same time with the foreign patent, or, if there be more than one, at the same time with the one having the shortest unexpired term, but in no case will it be in force more than seventeen years.

Protection to Inventors.

What is a patent? It is a monopoly or grant, in the United States, for a term of seventeen years, to the patentee, his heirs or assigns, of the exclusive right to make, use and vend the discovery throughout the United States, as the inventor's rights may appear in the specifications and patent granted.

This means a great deal to the inventor who has secured a *valid* patent containing all the claims so worded as to prevent infringement and loss in contest. Thousands of inventors, obtaining patents through unreliable and inefficient attorneys or agents, find themselves possessed of patents *in name only*, and of no value when combatted by infringers with capital and the aid of able legal talent. A good patent costs no more than a weak and worthless one. Therefore how shortsighted are those inventors who employ cheap attorneys, saving $5 or $10 in fees, only to find themselves loosers of *all* they have paid when the contest comes.

The Need of Reliable Attorneys.

The Revised Statutes of the United States provide that "before any inventor shall receive a patent for his invention, he shall make application therefor in writing to the Commissioner of Patents, and shall file in the Patent Office a written description * * * of the same in such full, clear, concise and exact terms, as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct and use the same; and in case of a machine, he shall explain the principle thereof and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions."

To carry out these provisions it is necessary for the inventor to first make a clear, concise and complete drawing, or a working model of his invention or discovery, and send it to THE INVENTIVE AGE, or some thoroughly reliable attorney, who, before making application for the patent, should make a thorough and rigid examination of the Patent Office to determine upon its novelty or patentability. If the invention has been anticipated by some one else, or if it lacks novelty, or if for any reason a patent can not be granted, or, if granted, would be of no worth or value, then the inventor does not want to incur the expense of making application and paying attorney's fees and government fees. For making this thorough examination THE INVENTIVE AGE and all reliable attorneys charge $5, which fee is, under some circumstances, however, taken out of the additional fees paid by the inventor in case letters patent are applied for. The fees of patent attorneys vary somewhat, but the average fees for obtaining a United States patent are about $65—the government fees being $15 on filing the application and $20 on issuing a patent—the balance being the fees for preparing specifications, making searches, etc. The inventor is sometimes favored in terms given for payment of the fees, more detailed information regarding which can be obtained by enclosing a 2-cent stamp with enquiry to THE INVENTIVE AGE, Washington, D. C. The reason why the inventor should have a preliminary examination of the Patent Office made before applying for a patent lies in the fact that if the case is rejected the fees paid to the government and the attorney are lost

All patents obtained through us will receive special mention in THE INVENTIVE AGE and in cases of unusual merit inventions will be illustrated free of charge to our clients.

This publication, reaching capitalists, manufacturers and business men throughout the world, is of value in assisting to bring an invention before the public in case its promotion or sale is desired by the patentee.

And What Do You Think of This?

JUST OUT! BRAND NEW! ENTIRELY ORIGINAL!

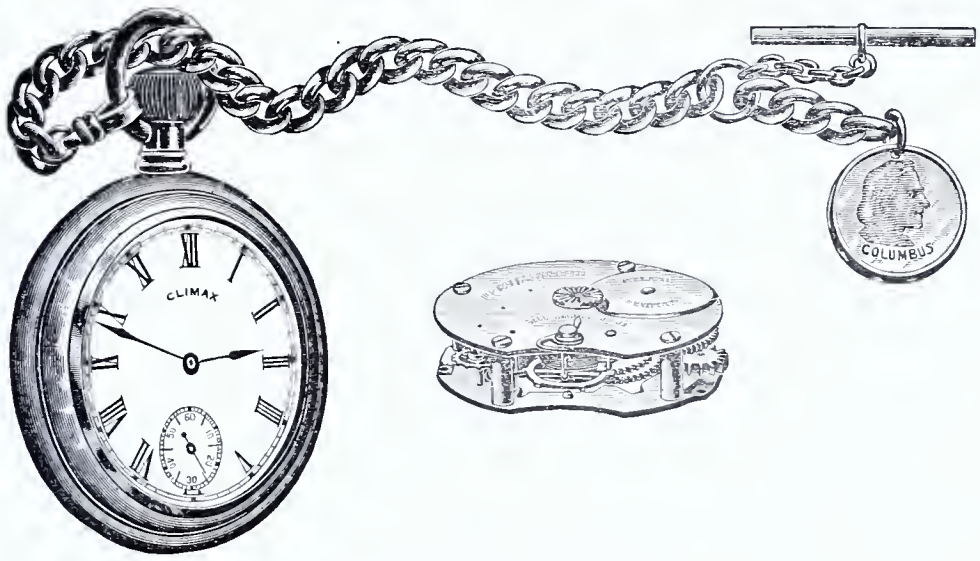
$2.

An American Stem-Winder.

A DUPLICATE IN QUALITY, APPEARANCE SIZE, ETC., OF ANY AMERICAN WATCH SOLD FOR LESS THAN $10.00

Our Watches are Positively and Unequivocally Guaranteed.

THE CLIMAX



EITHER ARABIC OR ROMAN DIAL.

This is the CLIMAX up to date. It represents the most important step taken in Watch evolution in many years. It describes a line beyond which nothing radical will pass for years, not only in the matter of PRICE, but QUALITY. The movement comprises many original patented features, and has been for years the subject of constant labor by one of the foremost of the foremost of expert and inventors.

DESCRIPTION.

CASES.—Two Styles, Plain and Imitation Engraved. Two Finishes, Solid Gilt and Nickel. Two Dials, Roman and Arabic. Snap Back. Heavy Bevel Crystal. Regular Stem Wind. Inside Stem Set. Regular 18 size Case. Chains assorted in each dozen.

MOVEMENT.—Regular American Lever, Lantern Pinion, Quick Train, 240 Beats per Minute Three-quarter Plate, Short Wind, Runs 30 hours to one winding. Dust Cap over Movement.

Fully Timed and Regulated, and FULLY GUARANTEED for one year, the same as Waltham or Elgin.

The Cheapest Stem-Winding Watch Ever Produced.

PRICE $2. With "THE INVENTIVE AGE" one year, $2.50.

JUST PUBLISHED.

How to Build a One-Fourth Horse-Power Motor or Dynamo.

By A. E. WATSON.

Illustrated with full working drawings.

PRICE, PAPER, 25 CTS. CLOTH, 50 CTS.

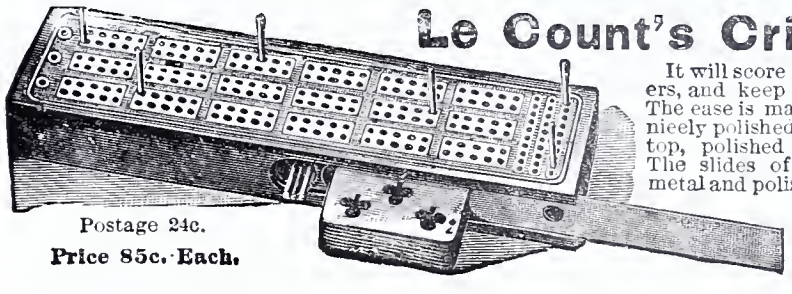
Address "INVENTIVE AGE," Washington, D. C.

THE STAR FOUNTAIN PEN.

A solid 14 karat gold pen in highly finished hard rubber holder. The only fountain pen that will give perfect satisfaction, sold at less than $2.50. We warrant it in every particular and refund money when it is not satisfactory. A gold pen alone of the same value costs in any retail store more than we charge for the whole outfit. Writes 25 pages fools cap to one filling.

By mail, $1.50 each; $12 per dozen.

With "Inventive Age" one year, $2.



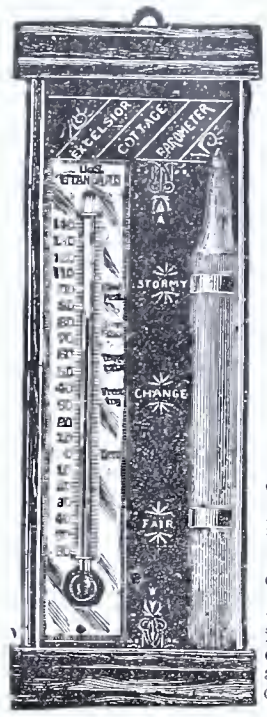
Le Count's Cribbage.

It will score for three or six players, and keep tally of the games. The case is made of black walnut, nicely polished; has a solid metal top, polished and nickel plated. The slides of compartments are metal and polished. This Board is superior to Boards that sell for three times the price. Full directions with each Board.

Postage 24c.

Price 85c. Each.

With "Inventive Age" one year, $1.60.



THERMOMETER & BAROMETER COMBINATION.

Combination Barometer and Thermometer.—Our well known leader. Blue and Gilt back with metal side posts. Fancy top and bottom and handsome enough to decorate the home of a millionaire. Extra well made and dependable on for showing changes in both weather and temperature. One of the biggest bargains in our list. A handsome thermometer, together with a glass tube containing a chemical preparation which rises and falls by action of the atmosphere, foretelling correctly all changes in the weather. This is a new style storm glass and the most reliable ever known, being in use in all signal service stations. The slightest change in the atmosphere in some way affects this glass. The thermometer is also of the best quality. Both are enclosed in a stand with walnut top and bottom and blue and gilt back. On either side is also a strong metal bar giving the whole great strength and adding to its appearance. Altogether it is a most remarkable combination for the price and we take pleasure in offering it to our patrons

This is not one of the many cheap combinations of which the market is flooded which are neither good for ornament or use and can never be relied upon to forecast either the weather or in fact any thing else.

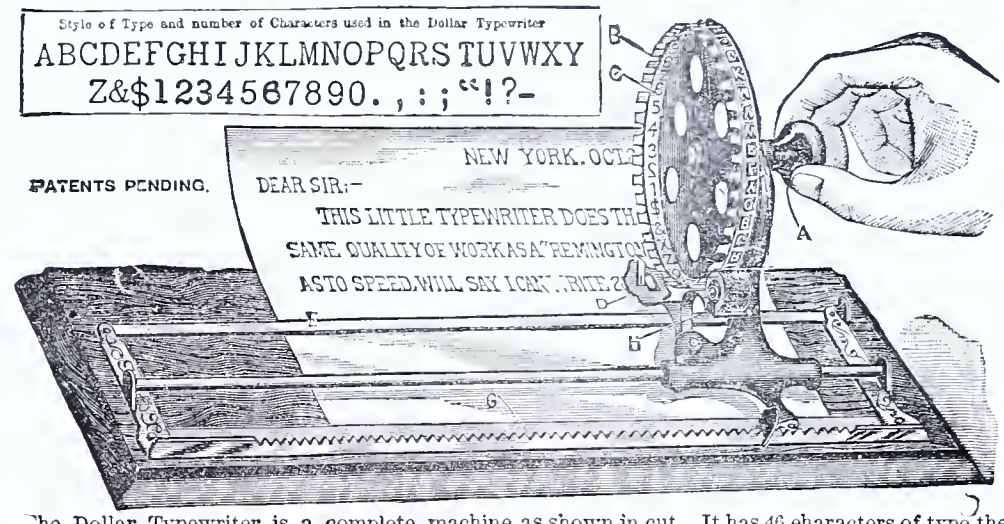
There is no reason for you to depend on the weather Bureau reports as every person who owns one of our Combinations, can make his or her forecast and tell exactly when it will be fine, rainy and in fact every change in the weather. With this you can tell whether to put on rubbers and a mackintosh or a pair of summer shoes and a costly dress. Don't take any more chances about the weather but be prepared. Each one packed securely in a neat box so that they can be mailed up without any fear of getting broken or damaged. Postage 10c. **Price 32c. Each; $3.00 Doz.**

With "Inventive Age" one year $1.25.

THE DOLLAR TYPEWRITER.

A PERFECT TYPEWRITING MACHINE.

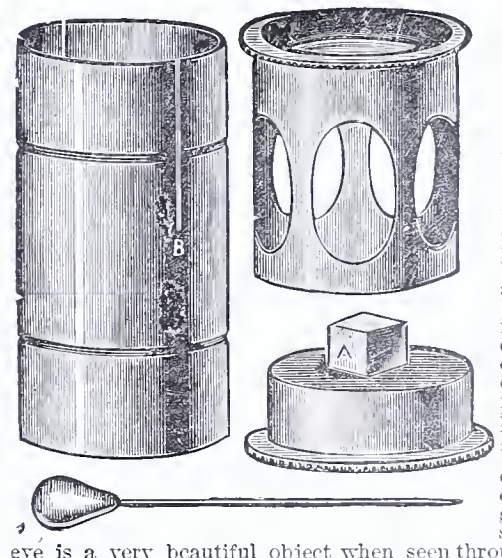
Price only $1.00 by Express; $1.15 by Mail.



The Dollar Typewriter is a complete machine as shown in cut. It has 46 characters of type the same as that used on a Remington. It is provided with numerous patented devices for inking the type, holding the paper, spacing and governing the impression and allignment. It will write a postal card, note or full letter sheet and is particularly well adapted to addressing envelopes. It is a practical illustration of what a rare combination of ingenuity, skill and capital may do as it embodies many difficult and expensive mechanical movements which were heretofore only possible in high priced machines. Over a **QUARTER MILLION** of these machines have been sold within the last year and the secret of its great success is that the manufacturers commenced with a foundation of original ideas and then spared no expense in putting them to practice by the use of the best machinery to be devised. If no more could be said of it this Typewriter is worth many times its cost as an instructor of children teaching and amusing at the same time, but its features of practicability commend it to the use of nearly everyone and the sale it has had and will have is not surprising. It **IS A PERFECTLY CONSTRUCTED** machine that will do work equal in quality to any of the high priced machines. It is so **SIMPLE** that a **CHILD CAN OPERATE IT** and will not get out of order. It is **LIGHT** and **PORTABLE**—just the thing for travelers. It is very **ATTRACTIVE** in appearance, made entirely of metal, mounted on a highly polished hard wood base. It will **WRITE RAPIDLY** with practice—15 to 25 words a minute. We **GUARANTEE** every claim for it, and if not as represented **REFUND MONEY.** The **PRICE** is but **ONE DOLLAR!** This is the age of typewriters, and no one should be without one.

Any typewriting that may be done with any of the high priced machines, from $100.00 down may be done with this one. It is now possible for **EVERYONE** to own a Typewriter and address and write their letters, postals, etc., in the same way the richest firms do theirs. The monopoly in Typewriters died when **"THE DOLLAR"** was born. Postage 15c. **Price $1.00 Each.**

With "Inventive Age" one year, $1.75.



COMBINATION MICROSCOPE.

Scientific skill and the greatest perfection in workmanship coupled with a very high magnifying power, distinguish this handsome microscope over all others ever offered at popular prices. It is specially imported from France, and readily sells for one dollar at retail. As regards power and convenience of handling, good judges pronounce it the best ever introduced for popular use. The cylindrical case is manufactured from highly polished brass, while there are two separate lenses—one at each end of the microscope. The larger glass is a convex magnifier, adopted for examining insects of various kinds, the surface of the skin, the hair, fur or any small articles. It will magnify the hairs on the hands or arms till they resemble large ropes, and it is a most interesting companion. The other lens is exceedingly powerful, and will clearly delineate every small object, entirely invisible to the naked eye such as the animalcules in a drop of water, fishes, feathers and the minutest insects. An interesting illustration of its great power may be had by placing a drop of sour flour paste upon the bottom of the lens, when on looking through the eye-piece, the sight of the writhing mass of thousands of worms, snakes and eels, is one never to be forgotten. Thousands of living animalcules can be seen in a single drop of stagnant water. An insects eye is a very beautiful object when seen through this microscope. It reveals hundreds of small eyes or six sided facets resembling net work or honeycomb, which enables the insect to see in all directions without moving its head. There are 4,000 of these little eyes in the single eye of a fly. It is invaluable in detecting adulterations in food, such as flour, tea, coffee, sugar, spices, milk and the fatal trichina spiralis or pork worm. Postage 3c. **Price 47c. Each.**

With "Inventive Age" one year, $1.35.

The Inventive Age
AND INDUSTRIAL REVIEW

A JOURNAL OF MANUFACTURING INDUSTRY AND SCIENTIFIC PROGRESS

Sixth Year. No. 8. | WASHINGTON, D. C., AUGUST, 1895. | Single Copies 10 Cents. $1 Per Year.

UNITED STATES NATIONAL MUSEUM.

A Remarkable Collection of Specimens from all Parts of the Globe.

One of the greatest attractions to the tourist in our Capital City is the U. S. National Museum, yet the sightseer cannot begin to comprehend the scope of this vast collection unless he remains many weeks in the city. Only the residents of Washington and those whose desire to be instructed and informed impels them to often visit this storehouse of valuable knowledge can appreciate its value. The Museum had a nuclens in the Patent Office collection of specimens, and later in the Smithsonian collection. It was owing to the want of a repository for the great and increasing number of relics, curios and specimens gathered by the different governmental exploring expeditions that Congress consented to appropriate in 1879 money to construct the commodious building which, with its priceless contents, is to-day the pride of the nation.

The Smithsonian Institution, following out the design of its founder—stimulating scientific inquiry, fostering and promoting exploration and investigation of the climate, products and antiqnties of this country; the U. S. Ethnlogical Bureau and the Geological Survey, with its trained corps of men famed for original discoveries, are great feeders of the Museum, and to thesc institutions, the first-named a noble private benefaction, the latter a recognition by Congress of the necessity of exploring scientifically the great areas of our public domain in the far West, and of preserving the history and habits of the antochthonous inhabitants of the United States, the unique character of the exhibits is indebted.

The Museum, however, is not merely a place of deposit for scientific material, but, by means of a thorough classification and the illustration of the history of human culture, it is destined to become the most comprehensive and instructive educational exhibit in the world.

The building, commenced in April, 1879, and occupied in 1881, is in the form of a square, with sides of 327 feet extreme length and a central rotunda or dome. Within its walls are a net area of 102,200 square feet, or 2 35-100 acres, is covered in by roofs. It contains underground basement rooms for a steam-heating apparatus, a steam-engine, coal vaults, etc. On the main floor there are seventcen halls which freely communicate with one another by wide and lofty archways, furnishing 80,300 square feet of floor space. On the main floor and two upper stories there are 27,400 square feet of floor space divided into 135 rooms for offices, working rooms, photographer, restaurant, etc. There arc also about 4,000 square feet floor space in the galleries.

ROTUNDA OF U. S. NATIONAL MUSEUM.

The centre of the building is octagonal on the ground, surmounted by a 16-sidcd polygon of 67 fect diameter, the dome being 108 feet high. In the centre of the rotunda stands a replica of thc colossal statute of Liberty which crowns the lofty dome of the U. S. Capitol building (sce illustration). Four nans radiate from the dome and extend to the outside walls of the building, forming a Greek cross. There are over 300 exhibition cases, all constructed of mahogany and the number of specimens foots up 1,469,000.

Should the visitor decide to give one minute of time to each object these figures can be appreciated by thc knowledge that it would take three years to thus glance through the collection.

As Prof. Goode, the efficient Director of the Museum, says in his report:

"It is a *Museum of Record*, in which are preserved the material foundations of an enormous amount of scientific knowledge—the types of numerous past investigations. This is especially the case with those materials that have served as a foundation for the reports upon the resourccs of the United Statcs. Types of investigations made outside of the Museum are also incorporated.

"It is a *Museum of Research*, by the policy which aims to make its contents serve as fully as possible as to stimulus to and a foundation for the studies of scientific investigators. Research is necessary in order to identify and group the objects in the most philosophical and instructive relations. Its officers are selected for their ability as investigators, as well as for their trustworthiness and abilities as custodians, and its treasures are open to the use of any student.

"It is an *Educational Musuem* of the broadest type, by reason of its policy of illustrating by specimens every kind of natural object and every manifestation of human thought and acticity, by displaying descriptive labels adapted to thc popular mind, and by its policy of distributing its publica-

(*Continued on page 123.*)

The Inventive Age

Established 1889.

INVENTIVE AGE PUBLISHING CO.,

8th and H Sts., Washington, D. C.

ALEX. S. CAPEHART. MARSHALL H. JEWELL.

The INVENTIVE AGE is sent, postage prepaid, to any address in the United States, Canada or Mexico for $1 a year; to any other country, postage prepaid, $1.50.

Correspondence with inventors, mechanics, manufacturers, scientists and others is invited. The columns of this journal are open for the discussion of such subjects as are of general interest to its readers.

Technical matter is particularly desired. We want practical information from practical men.

Nothing will be published in the editorial columns for pay.

The INVENTIVE AGE is thoroughly independent.

Advertising rates made known on application. Special facilities for furnishing cuts of any patented article together with descriptive article. Business specials 25 cents a line each insertion, 7 words to the line. No advertisement less than 50 cents.

Address all communications to THE INVENTIVE AGE, Washington, D. C.

Entered at the Postoffice in Washington as second-class matter.

WASHINGTON, D. C., AUGUST, 1895.

BELGIUM is to have protective duties, the bill having passed the senate by a vote of 59 to 33.

IT is said that the next term of the United States Court will be an important one, something like 100 cases remaining on the docket to be disposed of.

MAYOR PINGREE is accomplishing a great deal for the people of his city. He is pushing the reforms and innovations in every direction, and through his efforts the trolley fares have been reduced to three cents.

READERS of THE INVENTIVE AGE will find some interesting articles in this issue. This magazine will be properly represented at the Atlanta exposition and arrangements have been made for a series of special articles descriptive of that great event.

THE discovery of a high grade of stone in South Dakota promises to put a stop to further importation of the finer grades of grindstones from Bavaria, France and Scotland. It is curious fact that until this discovery the United States has been unable to produce a grindstone of such fine texture and "biting" qualities as the stone imported from Europe.

THE July number of Street Railway Journal presents a carefully tabulated statement showing the capitalization of American street railway systems. There are 976 roads with 1,914 miles of horse track; 10,363 miles of electric and 632 of cable and 679 miscellaneous—total 13,588 miles. The capital stock is $748,014,206 and funded debt $552,125,505, or $40,600 per mile of track. The capital liabilities are $1,300,-139,711, or $95,600 per mile.

CHICAGO will return good for evil and make an elaborate exhibit at the Atlanta exposition. Chicago day will be made the occasion of a monster demonstration. Many of the northern states will also make elaborate displays, in some instances equalling the Columbian exposition at Chicago. The South is fairly outdoing herself in her eagerness to illustrate her wonderful resources to the world and the results of the exposition must prove immensely beneficial to that region.

IT is probable that at least half a million laborers have been directly benefitted by the partial return of industrial prosperity. From over 800 manufacturing establishments comes reports of an increase in wages and doubtless there are as many more not reported. The return of industrial prosperity ought to bring great benefits to inventors, mechanics and others who have not been able to interest capital in their inventions during the past two years will now find a more venturesome, speculative feeling and a desire on the part of manufacturers and other operators to apply all labor-saving devices that are feasible.

SHORTLY before the World's Fair much appeared in print regarding the proposed air line between Chicago and St. Louis on which passengers were to be conveyed at the rate of 100 miles an hour. A great deal of business was figured out on paper and not a few were induced through the ingenious prospectus to invest in the enterprise. But little real work was ever done, however, beyond the renting of offices and printing of stock certificates, and now the complete collapse of the scheme is announced. Dr. Wellington Adams, the promoter, secretary and manager, says, however, that the company stiil has an existence and with better times he hopes for success.

WILLIAM E. CURTIS, the well-known Washington newspaper correspondent, now in Japan, is writing some intensely interesting letters for the Chicago Record. He pays the Japs a high compliment on their thrift, enterprise and moralty. Such a thing as a drunken man is seldom seen in Japan. This he attributes to the fact that the Japs use tea instead of liquors as a beverage. The tea houses in Japan take the place of the saloons. In a manufacturing way the Japanese are just beginning to develop. They are apt students and are not slow in adopting modern machinery and appliances in all lines. The people are frugal and many are becoming skilled in the manufacturing arts. A victorious army is now disbanding and there abounds a universal ambition to develop the resources of the country and build up a great and powerful nation. It is said that in Osaka, in which there is more commercial activity than in any other city in the empire, there was scarcely a manufacturing establishment ten years ago and now there are over 500 smokestacks and the city promises to become one of the most important manufacturing centers in the world.

Wooden Skates.

Editor Inventive Age:

I used to wonder how people could get about on bone skates and wooden skates without a particle of iron in them. In the old Norse Runes there is a story of a man, or a chief, who bragged that he could traverse the North on his skates of wood. This last winter I went over the matter and found a most excellent example of the life history of primitive invention. We say that the necessity and the man make the occasion; but it takes the necessity, the man and the means at hand to make an invention. Before plunging into my story I must be indulged in just one more explanatory remark. Flying about the North on skates of wood just to be going or for fun is the climax of the invention under consideration. Before that, men went about on wooden skates because they had to do so, for the triple purpose of making a journey, of bearing a burden or of hauling a sledge. Not to keep you waiting, the wooden or bone skate is the snowshoe, which is an excellent example of an invention ruled by the need of getting about on snow and ice, by climatic and geographic considerations and by the people or inventors.

About Bering Strait you will find the poorest snowshoes on earth, the fundamental device as we should say. You have only to take a whale's rib, hack it in the middle and bring the two ends together and lash them with thong or baleen and the frame is ready. Be careful to bore holes through which to reeve the thong and ream the outsides with your stone gimlets, or the ice, with its keen razors when your Fahrenheit is 40, will soon cut the seizing. For your foot rest you have only to bore a few more holes along the sides of the frames and reeve a coarse netting of the same thong and your bone skates are ready. You will not need any of the fine network that the Quebec Snowshoe Club use, because you wear hugh boots with whalestone soles and inside of that a bunch of grass. In the South, where buckskin moccasins clothe the feet, you will be obliged to make your network finer. If whale ribs give out and driftwood come near, or, what takes place all the time, if you can make a trade for driftwood with your friend five hundred miles away you will do it and whittle out a frame work precisely like the one from whale rib. Now, this old-time bone and wooden skate existed in our century from Siberia eastward to Cumberland on the Atlantic. It is easy to mark its geographical limits. Southward from the original patent in America the thinker has thought in three directions.

1. In the Rocky Mountains as far south as Northern California, when the occasion arose, having a plenty of tall, slim and flexible saplings, the inventor simply bent two of them into hoops, stretched thong across in only a tolerably methodical manner and he, or perhaps she, was mounted on skates of wood.

2. On the eastern slopes of the Rockies from Mackenzie mouth as far south as Nebraska, the inventor, finding deer plentiful and birch wood abounding, preserved the exact shape of the Bering Strait type, but made the frame more elegantly with its pointed heel and toe, the latter beautifully curved up. But for his moccasined feet he made the neatest webbing of babriche or buckskin cut into fine string.

3. The Athapascan, Algonkian and Iroquoian tribes combined the round or hooped end with the elegant webbing and that gives you the parentage of all American snowshoes.

In all of these the webbing exists because the wearer is not a gentleman or a lady or a prince, but a common hunter, or packer, or traction beast for a sledge. To use a Patent Office phrase, his skates must have ratchets on them and the netting as well as the outlined frame furnish these. The American snowshoes are the elementary type, for drudgery only, you cannot slide down hill on them or have any fun whatever.

Now let us go back to Bering Strait. Southward live the Chukchi, Korak, Lamut, Kamchadal, Tungus and Yakut. So long as you are north of the timber line you have got to wear the framed snowshoe, but just as soon as you get to the good timber the inventor, the disturber always of the present regime, cuts down a pretty, straight tree, say eight inches through, marks off a log not over seven or eight feet long and uses it so as to get two thin planks from the middle. With his knife, exactly like the one used by farriers, he whittles out his woopen skates, bends them up in front, points them, polishes them, puts a batton on for the foot and adjusts the straps. Finally, and you must notice this, he either attaches a border all around underneath, to sink into the snow and hold, or, much more frequently fastens beneath a long strip of hide from the reindeer leg or from the hair seal, with the hairs pointing backward. Here is the ratchet The shoe will move forward, will even slide down hill with the wearer, but it will not slip back any more than a netted shoe will. This is the shoe of the Amoor, of Kamchatka and throughout Siberia; but the Amos, the Kunte people have the Bering Strait type.

There is one step further in the evolution. The Siberians have to work hard on their showshoes, to pack, to travel and to break paths for their deer and dogs. I have seen pictures of an old fellow stand on his snowshoes and driving reindeer or dogs in front of him to drag him along, turning himself into a sledge. This Siberian shoe is only a half emancipation from drudgery, it is half work and half play.

You are now ready to pass to Lapland and Norway, to strip the bit of hide from the bottom of your shoe, to remove the beading from the margins and abandon yourself to pleasure and travel. Burden bearing on them is no longer pleasant and dragging a sledge impossible. I have two examples and both of them have a shallow groove plowed along the middle of the bottom from end to end to hold the traveler in his straight forward course and to prevent drifting. These grooves are not necessary, as the skater or skeeman may prevent drifting by means of the margin of his knee.

Finally, you never will see a snowshoer or skeeman without his staff. With it he rows himself along, turns corners, steadies himself, impedes his course on a hill, helps himself uphill, without the staff he is lost. The Eskimo and the Asiatics put a little snowshoe on the bottom of the staff. I have seen one in British Columbia and the Giliates on the Amoor have the same device. But I shall leave it to the department of interferences in the Patent Office to say whether one patent covers them all. On his skees or wooden skates the Norseman and the Lapp still perform wonderful feats of speed, agility, and they even learn to jump over wide chasms with their aid. O. T. MASON.

June 29, 1895.

The Chicago Drainage Canal.

The admission of Assistant Engineer T. T. Johnston, of the Chicago drainage board, is, that "when Lake Michigan's level is at its highest normal point and the drainage channel is taking from the lake its maximum capacity of 600,000 cubic feet of water a minute, or 10,000 a second, the reduction of the level will be between five and six inches. At its average level, year in and year out, the reduction of the level will not exceed three and one-half inches. When the lake level is at a low point and the channel is taking but 300,000 cubic feet a minute—the minimum capacity—the reduction will be but a fraction over one inch. In either case the change will not be sufficient either to affect navigation at any of the lake ports or to disturb the volume of water passing through the Niagara river and over Niagara falls."

NOTES.

Gold.—Twenty-four carat gold is all gold; 22-carat gold has 22 parts of gold, 1 of silver, 1 of copper; 18 carat gold has 18 parts of pure gold and 3 parts each of silver and copper in its composition; 12 carat gold is half gold, the remainder being made up of three and a half parts of silver and eight and a half parts copper.

* * *

Largest Tunnel in the World.—The Simplon tunnel, which is now being constructed between Switzerland and Italy. This tunnel, when completed, will be 12¼ miles long. The nearest tunnel, from a longitudinal point of view, at present is the St. Gothard, which measures 9⅓ miles, then comes Mont Cenis, 8 miles long, and the fourth is the Hoosac, 4¾ miles.

* * *

Diamond Setting for Tools.—In working hard materials with diamonds set in metal there has always been a difficulty in preventing the stone from being ripped out by the strain. An effective method of doing this has been devised. A little block of steel, suitably notched to receive the diamond, is brought to a red heat, the diamond is inserted, and the block is passed through a small roll. The diamond is thus firmly imbedded in the block, though projecting slightly beyond its surface, and defies the strain of the most exacting work.

* * *

The Yerkes Lens.—The completion a few years ago of the object-glass of the Lick refractor, with a diameter of 36 inches, was rightly considered an important event in astronomy, but the Yerkes lens, now ready at Cambridge, Mass., is 41½ inches in diameter, and is without an equal in size. When it is mounted at the Lake Geneva, Wis., observatory the attention of astronomers throughout the world will be turned in that direction as the most probable point of new discoveries.

* * *

Hats made from Wood.—A Connecticut man has patented a machine for making hats out of wood. A log of wood, cut square, fed to the machine, is converted into fine strips of wood much resembling excelsior. It is claimed that when these are moistened they can be woven much more readily than straw, and make a durable hat. The inventor says the substance is lighter in weight than straw, and that because of its easier manipulation and lower cost it will supersede the straw now used for headgear.

* * *

The Great Baltic and Black Sea Canal.—The ship canal between the Baltic and the Black Seas will be about 1,000 miles long. There are no very formidable engineering difficultiee. The estimated cost is $100,000,000, and the construction will occupy about five years. The canal will be 27 feet deep, 213 feet wide at the top, and 114 feet at the bottom. It is to run from Riga, follow the course of the Dwina, Beresina and Dnieper, and end at Cherson. The canal will be lighted by electricty along its whole length, enabling the transit to be performed in six days, reckoning six knots as a maximum speed. Other towns and districts besides those touched by the canal will be benefited, owing to the improvement of navigation in the various rivers.

* * *

New Substitute for Gold.—The Journal de l'Horlogerie claims that a new alloy, which it describes, is a remarkable substitute for gold. It is comyosed of 94 parts of copper and six of antimony. The copper is melted and the antimony is then added. After the two metals have been perfectly fused together, a little magnesium and carbonate of lime is added to increase the density of the material. The product can be drawn out, wrought and soldered just like gold, which it almost exactly resembles when polished. It preserves its color, it is said, even when exposed to the action of ammoniacal salts or nitrous vapors. The cost of making it is about a shilling per pound avoirdupois.

* * *

Horseless Carriages.—A novel test has just been carried out in France between a number of "horseless carriages." The event consisted of a race of road vehicles propelled by steam or petroleum power, the course being from Paris to Bordeaux and back, a distance of about 460 miles. The first prize, $8,000, was awarded to a four-seated petroleum carriage, one of the number manufactured by Les Fils de Peugeot Freres, which accomplished the round trip in 2 days and 53 minutes, being an average of 14.9 miles an hour. Seventy-six horseless vehicles participated in the test. It was carried out on strictly scientific lines. This event is expected to give a notable impulse to the use of these new automatic vehicles.

A Great Engineering Feat.—An engineering plan of enormous proportions, and one that will cost $27,000,000 to complete, is the metropolitan water supply system which the Massachusetts legislature authorized at the last session. It proposes to furnish an adequate supply of water for Boston, Chelsea, Everett, Malden, Medford, Newton and Somerville and to the six small towns lying nearest to Boston. The population in this district includes about one-third the entire population of the State, and it is growing with disproportionate rapidity. The nearest source where a sufficient quantity of pure water can be found is in the south branch of the Nashua River, and this will yield 472,000,000 gallons daily, a supply adequate for the wants of the district for some time to come.

* * *

Submarine Cables.—The total length of all the cables laid up to the present time is said to be about 157,713 nautical miles. Some of these cables have only one core, but some have two or more. The total length of core in the above-mentioned length of cables is about 166,900 nautical miles. Of this length 165,000 is insulated with gutta-percha and 1,900 with india rubber. The approximate weight of gutta-percha used in the above insulation is 23,000 tons for the 166,900 miles. The approximate weight of india rubber is about 152 tons. Besides the above mentioned submarine cables, there must be some 100,000 nautical miles of cables laid by various governments and states for military defense. The longest stretch of cables are, of course, those running across the Atlantic to North and South America, and the shortest across the English and Irish channels, and between Java and Sumatra and Athens and Corinth.

* * *

Greatest Diamond in Existenee.—The finding of a large diamond always causes much comment because of its great value. The largest diamond ever found is called the "Excelsior" and was found near Jagers fountain, in the Orange Free State, Africa. It weighs 971 carats and is worth nearly $5,000,000. With great caution and under heavy guard this precious gem was transported to London, where it now rests in the vaults of the Bank of England. The next largest diamond in the world is the one owned by the Rajah of Matan on the Island of Borneo; this one weighs 367 carats. The handsomest of all the large diamonds known is, however, the one in the French collection of crown jewels, known as the "Regent," which weighs 136¾ carats. Louis XV. paid 3,000,000 francs for it, but now it is valued at 10,000,000 francs, or $2,000,000. How much the "Excelsior" will lose in cutting can only be decided by most eminent experts. As a rule, the larger diamonds lose fully one-half of their weight in the operation.

* * *

American Railroads.—The seventh statistical report of the Interstate Commerce Commission, which has just been submitted, covering the fiscal year 1894, shows the total railway mileage of the United States at that time to have been 178,708, an increase during the year of 2,247 miles, as compared with an increase of 4,897 miles in 1893.

During the year 1,570 locomotives and 30,389 cars were fitted with train brakes, and 1,197 locomotives and 34,186 cars were fitted with automatic couplers. Nevertheless about 72 per cent of the total equipment are still reported without these safety appliances. The law requires that all equipments shall be supplied with these appliances before June, 1898. The total number of railway employees on June 30, 1894, was 779,606, a decrease of 93,994, and less than in any year since 1890. The total amount of railway capital reported on June 30, 1894, was $10,796,473,813, an increase of $290,238,403. The gross earnings of the railroads for the year showed a decrease of $147,390,077, or nearly 12 per cent. Railway employees killed during the year numbered 1,823, and 23,422 were injured, as compared with 2,727 killed and 31,729 injured in 1893. At the close of the period covered by the report, 102 roads, operating upward of 42,000 miles of line and representing about one-quarter of the total railway capitalization, were in the hands of receivers.

The past winter in Greenland was unusually mild, and the climatic conditions have favored Mr. Peary's expedition. The barks Silicon and Salina, the first of the fleet of cryolite traders to arrive at Philadelphia from Ivigtut, report that the Greenland coast has not been choked with ice as usual, while the brilliancy of the aurora made the long winter night almost like day.

Architects throughout the world will be invited by the Argentine Republic to submit bids for a new building intended for the use of the Congress of that country. Three prizes will be offered for the best design—one of $20,000, one of $10,000, and one of $5,000—and the architect receiving the first prize will be given the execution of the work.

United States National Museum.

Continued from first page.

tions and its named series of duplicates." As necessary adjuncts to the work of the Museum, a working library, a chemical laboratory, a photographic establishment, a workshop for taxidermy, modeling, and the preparation of skeletons, and several smaller workshops are carried on as a part of the general work of administration.

Among the wonders of this unrivalled display of interesting objects are the following: Egyptian mummies, 3,000 years old; Aleutian Island mummies; Peruvian mummies; Peruvian preserved head; the Lorillard collection of Central American antiquities; the Latimer collection of antiquities; Syrian sarcophagus presented to Andrew Jackson and declined by him; the Washington relics (about 200 relics of great value); totem poles from Alaska; Pueblo ox wagon; models of Zuni villiages and of ancient cliff dwellers; old loom made in 1819; the great Tucson meteorite; apparatus of Joseph Priestley, the discoverer of oxygen; the great Persian carpet; the million dollar feather cape; the Capron collection of antique Japanese works of art; collection of drugs and medicines; Sevres porcelain collection; Mexican antiquities; collection of metallurgy and economic geology; collection of boats and ships of all kinds; fishery exhibit; gifts to Gen. Grant, presented by Vanderbilt; Catlin Indian collection; casts of gigantic fossils; prehistoric specimens from caves of France; Franklin's printing press; natural history collection, a complete menagerie; magnificent exhibit of all the processes known in the art of engraving.

Reclaiming the Desert by Irrigation.

Irrigation is a simple but effectual method of supplying moisture for growing crops. The rain of the East cannot compare with the irrigation of the West. Instead of being a substitute for rain, irrigation is the superior of natural rainfall. A man with a supply of water for irrigation could control the growth, increase or diminish the quantity, and add to or take from the quality of plant life. The western part of America has been redeemed from its primitive state of aridity by the power of man in superintending the distribution of water over the surface. A new empire has been built up west of the 100th meridian, and the work of reclamation goes on steadily until, in the near future, the train of irrigation will turn to the West, and the thousands now homeless will find comfortable quarters in the land of sunshine and irrigation. Where the valleys have been irrigated homes have been established, the treasurers of the mountains unearthed, and the great natural ranges utilized. A perfect contest has been waged against the arid atmosphere. Man has conquered in this battle for life and wealth, and he presents to-day a picturesque scene of happiness on the former desert plains. Modern machinery has taken the place of the ancient man-labor devices. Railroads thread every valley of the old deserts, and peace and prosperity reign queen of the desert and king of the mountain. The hand of irrigation is the beginning of all this transformation, and its secret fingers have touched the mainspring of national wealth.—*Western Agriculturist.*

The Great Fountain at Geneva.

The largest fountain on the face of the globe, has recently been established at the entrance of the port of Geneva. It reaches the great height of over 300 feet and may be seen from a great distance, in clear weather, detaching itself like a great white sail flapping through the effect of the wind.

The city of Geneva possesses a most complete distribution of water under pressure, the motive power for which is obtained from an artificial fall established upon the Rhone at the point of the lake. The water for domestic purposes and for the running of certain motors is raised to a height of 215 feet above the level of the lake. For the distribution of motive force, it is raised to a height of 460 feet. The reservoir is an open air one, and is situated upon the top of Bessinges, at a distance of three miles from the turbine building. A very ingenious regulator, invented by Mr. Turrettini, assures the uniformity of pressure in the piping.

The length of the first pipe line is about 40 miles, and that of the second about 60. It is with this latter that the fountain conduit is connected. The latter is set in play only on Sundays. It is sometimes set in operation also on week days, in the evening. Instead of a single jet of great height, several are then utilized that do not rise so high. Powerful electric light projectors, placed in a structure near by, brightly illuminate them with their rays of varied colors, which transform them into a luminous fountain of the most beautiful aspect.—*La Nature.*

The "Trilby" is the trade-mark secured for a cigar by Messrs. Roth, Bruner & Feist of Cincinnati.

A Hole a Mile Deep.

A great novelty at the Paris Fair of 1900, says *Popular Science News*, is to be a dive into the interior of the earth. A plan, which has been approved by the management, is to dig a series of eight vertical shafts, each 600 feet in length, one beginning where another leaves off. Two passenger elevators are to run in each shaft, and there are to be galleries or stations at the end of each elevator journey, where refreshments will be served under the blaze of electric lights. The excavation, it is claimed, will be thoroughly ventilated, and the traveler who descends to the lowest depth will be about 4,800 feet below the surface. The estimated cost is $2,500,000. The projector says he hopes to throw new light upon the question of the increase of temperature as greater depths within the earth's core are attained, and upon other subterranean problems.

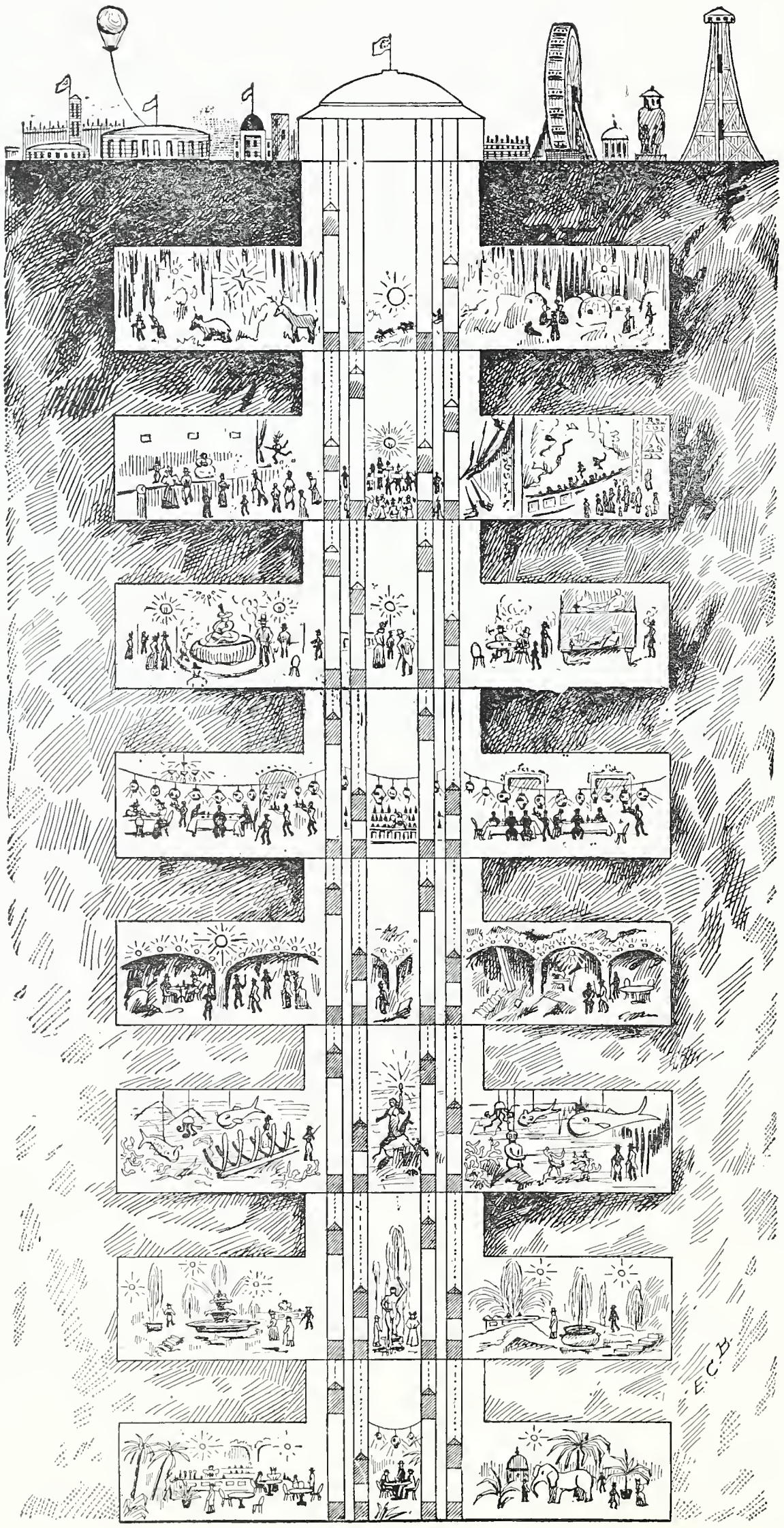
Some claim that this big hole in Paris will add little to our present knowledge of subterranean problems. Borings have now been carried about 900 feet nearer the center of the earth than it is proposed to extend this one. It is claimed that the deepest boring yet made is that at Schladebach, Germany, where a distance of about 5,740 feet has been attained, with a temperature at the bottom of 56.6° Centigrade. Such a thing as a uniform rate of heat increase apparently does not exist in the subterranean regions. Mr. G. K. Gilbert says that the rate of increase varies in different places ranging from one degree Fahrenheit for each 150 feet of descent to one degree Fahrenheit for each 30 feet. The general or normal rate is, perhaps, one degree in 75 feet. There are many local causes that greatly affect the increase of heat. For instance, in some of the lower levels of the Comstock mines in Nevada, though not more than one-half as deep as the boring at Schladebach, the men could work only three or four hours at a time owing to the terrible heat. This was caused by scalding water forced up from lower depths, which raised the temperature to 120° Fahrenheit.

It is said that this great hole can present few special attractions for visitors. Perhaps the novelty of the descent a considerable distance into the earth will fill the elevators. There will be lacking much of the sense of exhilaration such as comes from being at a great height.

But if the ventilation is good, and the plans carried out as our artist has drawn them, there will be many interesting and novel features in the descent and explorations of its various symbolical caverns.

The first gallery will represent the North Pole, the second will be given to various amusements, the third will be for smokers, the fourth to restaurants, the fifth to mines and mining and the sixth will represent the bottom of the sea. Below will be a region of mineral springs, and at the bottom it is intended to give an example of the equatorial tropics.

Though as yet very little is comparatively known of the interior of the earth below a few thousand feet, and many scientific men are devoting a great deal of time to finding out all that can be learned about it, they have found the upturned edges of rock strata lifted into the air, though which they know that at some remote age this rock must have been buried 20,000 feet under the surface. They have learned a good deal about the depth and geographical limits of permanently frozen soil, and they have found that, excellent wheat lands, north of Manitoba, overlie frozen earth that never thaws. But, after all, what they are able to examine in the earth beneath our feet is hardly more than what a pin prick on the skin of an apple shows of the fruit within. The result of this imperfect knowledge is that there are more theories among scientific men with regard to the interior of the earth than about any other problems of physical science.



PROPOSED PLAN FOR A DEEP EXCAVATION IN PARIS.

New Torpedo Boats.

Work has begun on the construction of three new torpedo boats for the United States Navy at the Columbian Iron Works and Shipyards at Baltimore. All the sectional drawings and plans have been approved by the Navy Department, and the working wooden models for the hulls of the vessels completed. The model is carefully excluded from the public gaze, and the officials of the work will give no detailed description of it. The torpedo boats are to be 160 feet long, 16 feet beam, and each with an average displacement of about 140 tons. They will be of steel. They are expected to make twenty-four and a half knots an hour, and their builders say they will do this or more. About midships and under the conning tower the keel will be flat. The forward part of the boats will have rounded covers of steel, while the covers over the stern and amidships will be flat. Two of the three torpedo tubes will be forward of the conning tower and the other one will be in the stern of the boats. Plans for the submarine boat, also to be built, also to be built at the Columbian iron works, are nearing completion, and work has been begun upon the working model. This boat will be eighty feet long, eleven feet beam, and five feet draft.

Street Railroad Statistics.

Statistics published by the Street Railway Journal show that there are now in the United States 13,588 miles of street railroad tracks. Of these 632 are operated by cable, 679 by miscellaneous means, 1914 by horse power, and 10,363 by electrical power, the latter being nearly 76 per cent of the whole. The cars employed number 44.475, and the capital stock and funded debt aggregates 1,300 million dollars, being an average of $95,600 per mile of track. The figures for capitalization are not stated for the different kinds of power employed, so that they do not present means for comparing relative cost. But the figures are grouped according to States, and it appears that about seven-eighths of the lines in New England are operated by electricity, while there are no cable roads in that section. The average capitalization for New England is $62.400, or about two-thirds the average for the whole country.

Out of 17,000,000 inhabitants of Spain, over 11,000,000 are unable to read or write.

A Razor-Back Ship.

LYING at a private wharf in Alexandria, Virginia, is a very remarkable ship. She is the first of a new type of vessel intended to revolutionize the ocean carrying trade. If the hopes of Mr. Fryer, the designer and builder of the ship, are realized, passengers will cross the Atlantic in three-fifths of the time now occupied by the "ocean greyhounds" of commerce.

Mr. Fryer has sought to apply the palace-car idea to ocean travel. He has built a ship which while 222 feet long is only 16 feet beam. Its equilibrium is to be maintained by the heavy keel and by the 80,000 pounds of machinery below the water-line. The narrow prow of such a vessel will cut the water like a knife. Resistance will be reduced to a minimum. The heavy compact machinery will furnish ample power for the single screw, and the little razor-back vessel will cleave through the water at a rate of speed which will seem incredible at first. All of this, of course, if Mr. Fryer's hopes are realized. The vessel is to have a practical test in the lower Potomac River in a short time. Then the *Howard Cassard*, as the new ship is called, will be taken to New York.

The ship now approaching completion at Alexandria is built to four-tenths the scale of full-sized ship. The transatlantic liner of this model will be

THE NEW RAZOR-BACK—END VIEW.

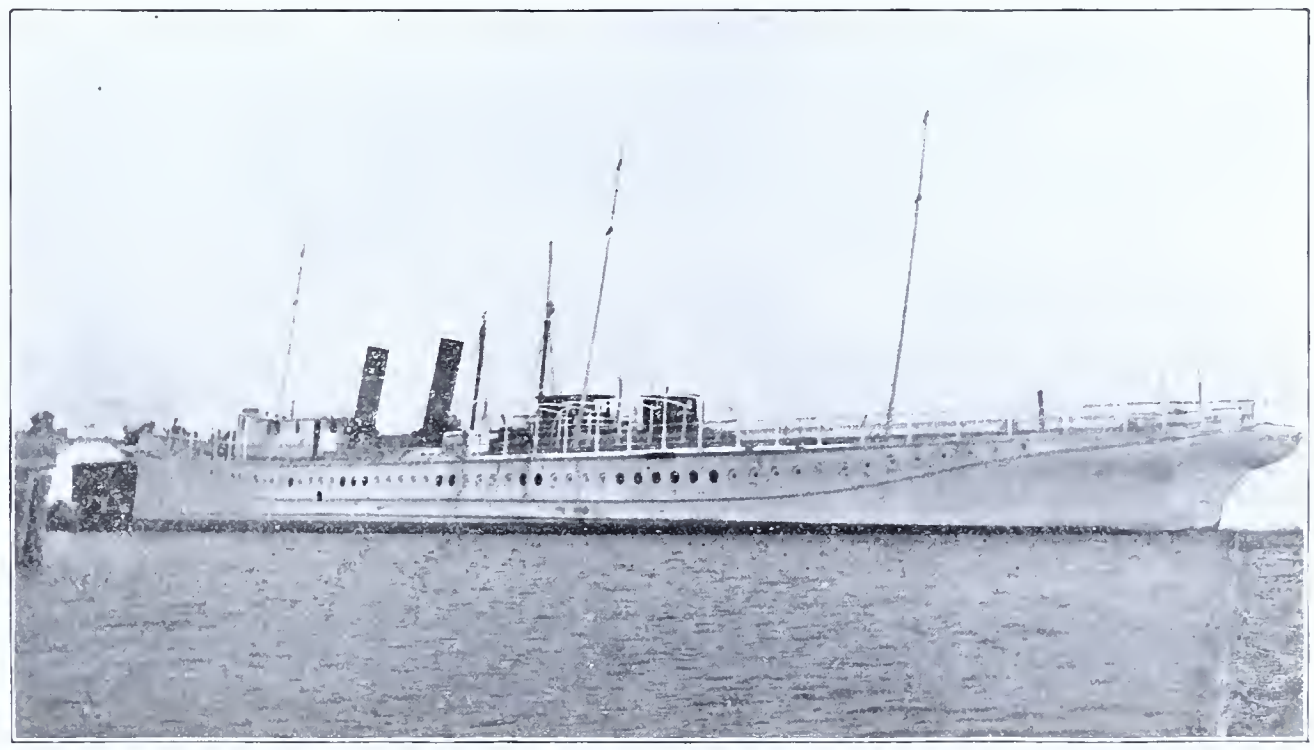
555 feet long, and she will be 40 feet beam. Measure 40 feet on a level peice of ground and you will get some idea how narrow the new ship will be. And from a greatest breadth of 40 feet she will taper to almost nothing.

Of course, with such a vessel the carrying of freight would be out of the question. There is a main-deck, a cabin-deck, and the hold. And the hold is quite filled with machinery. The upper deck is only a promenade, and the cabin-deck is so narrow that there is not space between the walls of the ship for even so luxurious a cabin as some private yachts contain. Such a thing as a general cabin would be out of the question. This narrow space has been untilized in part by the construction of single state-rooms on each side a narrow aisle running down the middle of the ship. The remaining space is to be divided up like a sleeping-car. Adjustable berths, upper and lower, will be concealed during the day, and each "section" will be supplied with handsomely upholstered seats. In these sections meals will be served from a galley in the hold, on small tables, just as they are served in a buffet-car. There will be a toilet room for men at one end of the ship, and a toilet-room for women at the other. When night comes the seats in the sections will be transformed into beds, the upper berths will be let down if they are needed, and each section will be screened from the aisle by portieres. In running to tropical countries the new vessels will carry a certain qualtity of fine fruit, two of the section spaces will be given up to refrigerators.

I stood on the cabin-deck floor of the *Howard Cassard* the other day when the machinery directly beneath was running and the screw at the stern was churning the waters of the Potomac. There was no perceptible vibration. And this floor has not been carpeted yet. It is to be covered with felt, canvas, and heavy carpet. The upper-deck floor will be covered in the same way, and an awning will run from one end of the ship to the other, covering this deck when needed.

The officers of the Navy Department at Washington are watching the experiment with interest. It is likely that the Chief Engineer of the navy will send some one to witness the trials for the information of the department.

It is the intention at present to put the *Howard Cassard* in service between the United States and Honduras: and Mr. Fryer's idea is to establish a daily service between this country and Central and South American points. The run to Honduras from Charlotte Harbor, Florida (the most southerly harbor on the coast reached by a railroad), can be made in thirty-five hours, if the *Howard Cassard* is a success. Mr. Fryer hopes to put on ships built to five-tenths scale, twenty feet beam, for this daily service. Fifty passengers a day would pay such a line very handsomely, and Mr. Fryer thinks that fifty passengers can be had. For service to the great South American ports he proposes to put on a vessel 555 feet over all and 40 feet beam. However, all of these things are in the future. Whether they will develop or not depends largely on the *Howard Cassard*—*Harper's Weekly*.



THE NEW RAZOR-BACK SHIP.

Recent Australian Patents to Americans.

The following list of applications has been specially prepared by Mr. George G. Turri, certificated patent agent. Melbourne. Australia:

C. H. Palmer, W. Denmead and J. A. Bangham, all of Akron, Ohio, machine for filling boxes with matches.
J. R. Leeson, Boston, Mass., assignee of J. W. Wardell, Boston, caps and method of and apparatus for winding same.
W. F. Hutchison, Passaic, N. J., wood cutting machine, bundling machine, shingle machine and preparing wood for same, railways.
M. Wanner, Yorktown, Ind., refrigerating process.
W. Christie, Toronto, Canada, biscuit making machine.
S. J. Laughlin and J. Hough, Ontario, Canada, drawing, sketching and designing table.
T. H. Stackhouse, Philadelphia, Pa., typewriting machines.
B. T. Lacy, San Francisco, Cal., assignee of A. Ropp, roasting, chlorinating and sulphurizing furnace.
J. B. Howe, Danbury, Conn., hat pouncing machine.
W. T. Bradley, Rochester, and Major R. Jewell and C. E. Jewell, both of Seneca Falls, N. Y., wringers.
W. C. Savage, New York, N. Y., rocking liquids.

As will be seen in the advertising columns THE INVENTIVE AGE will give full particulars regarding Australian patents free. The Australian colonies offer an excellent field for American inventors.

The Wheel.

The discovery and progressive improvement of the bicycle is of more importance to mankind than all the victories and defeats of Napoleon, with the first and second Punic wars and any number of other clamorous historic conflicts thrown in. It is now only in tho first steps of its progress, though it has mode its way around the world, and is everywhere extending its field of use with marvellous rapidity. All European countries use it, and it has spun over the Asian border, bewildering the sedate and leisurely Orientals with its lightness and brightness and speed, as of gazelles and dromedaries, and it is quite possible that the Grand Turk and the Sheik ul Islam may in no long time adopt them, not only in private use, but in their ceremonial processions, giving them official and religious sanction, and encouraging the faithful to follow their example.

Islam on wheels instead of mules and camels or toilsomely afoot will be a spectacle not prophesied in the Koran, but probably invading none of its precepts, and it is quite sure to come about in some degree greatly to the advantage of that numerous and rather lazy people. Damascus and Bagdad and Samarcand and Ispahan and Bassorah, perhaps Medinah itself, and holy Mecca, will come to have their wheeling clubs, with local practitioners scoring the finest records. Already they are heard of in Japan, where the natives are about to engage in their manufacture, and they have begun their progress in India and China, where they will no doubt in time spread all over the peninsula and the Empire. Corea and Manchuria will lose no time in adopting them, and there is the whole Indian Archipelago, with its hundred races, anxiously awaiting its advent. It promises to usurp the dominion of the whole world which is in any degree civilized, and to extend the power of man in moving to and fro in a greater degree than any device ever adopted.

It is not likely that all ingenuities are yet exhausted in its structure. A good many improvements may yet await it, the most important of which would be a propelling motor, mitigating the some what exacting leg action now required, and perhaps allowing the rider a more graceful attitude than the one he sometimes assumes at present. A bicycle that would run itself with any desired degree of swiftness up to a reasonable limit, only requiring to be steered and balanced, would be the ideal instrument, and an army of inventors is engaged on the problem. Perhaps they will solve it some day. Meantime the wheel in its present state of development is a thing of beauty and joy worthy of the paeans of celebration which everywhere go before and follow it.

The goddess Fortune is generally depicted as running a unicycle, but that is now behind the age. She should mount a bicycle, either in a divided skirt or otherwise as to her divinity may appear most becoming—a single amulet answered very well in the old mythologies, but an added one will be found a convenience even by the capricious Olympian goddess mentioned, doubling the frequency of her visits to mankind, if not increasing the profusion of her gifts.—N. Y. Tribune.

Summer Vacation Tours.

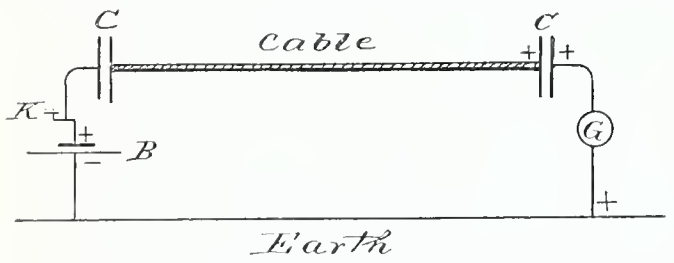
The Baltimore and Ohio R. R. Co. now has on sale at all its offices east of the Ohio River a full line of tourist excursion tickets to all the lake, mountain and sea-shore resorts in the Eastern and Northern States and in Canada. These tickets are valid for return journey until October 31. Before decided upnn your summer outing it would be well to consult the B. & O. Book of "Routes and Rates for Summer Tours." All B. & O. Ticket Agents at principal points have them, and they will be sent postpaid upon receipts of ten cents by Chas. O. Scull, Gen'l Passenger Agent, B. & O. R. R., Baltimore, Md.

SCIENCE FOR YOUNG PEOPLE.

Conducted by E. P. Lewis.

The first Atlantic telegraph cable was completed in 1858. Now more than 150,000 miles of cable link together nearly all parts of the world, civilized and uncivilized, twelve of these lines crossing the Atlantic alone. Owing to certain unavoidable difficulties, the methods of telegraphy over these cables differ considerably from those used on land.

Most of the readers of this department are probably familiar with Leyden jars. If a glass bottle be lined inside and outside with two separate coatings of tinfoil, and if one of these coatings be charged by an electrical machine with positive electricity, let us say, while the other coating is connected with the earth, the positive charge will,



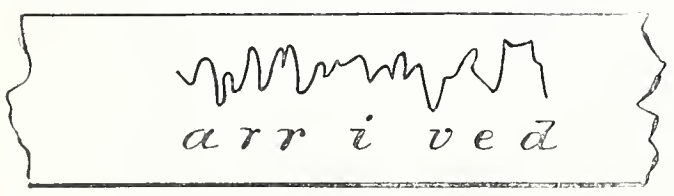
by a process which is called "electrostatic induction," attach and hold an equal quantity of negative electricity on the opposite coating. This is an instance of the general law that unlike kinds of electricity attract each other. If the two coatings be connected together by a conductor the two kinds of electricity will unite with a spark and neutralize each other. The same thing occurs when we have any two conducting bodies separated by a non-conductor, and charge one of the conductors. All such arrangements form what are known as condensers, of which the Leyden jar is a special case.

A submarine cable consists of a number of insulated copper wires twisted together in a spiral strand. They are then covered with several layers of gutta percha or some similar insulating substance. Around the outside is covered spirally a protecting sheath of steel wire covered with hemp. Around this is the conducting salt water of the ocean, which is separated from the copper wires which convey the electricity by the non-conducting layers of gutta-percha. We have here a long Leyden jar stretching across the ocean.

If we connect such a cable to a battery and try to send a current through we shall find that in spite of the great velocity with which electricity travels, it will be some time before it will produce any effect at the other end. The reason is that the current does not flow straight across, but most of it is diverted to charging the inside of the cable, inducing thereby an equal charge of the opposite kind on the outside of the cable, just as in the two coatings of the Leyden jar.

Owing to this retardation, it takes several seconds for a strong current to develop itself at the further end of the line, although feeble effects are manifested almost instantaneously. For this reason, the signalling instruments used in submarine telegraphy must be much more sensitive than those used on land in order to avoid the delay of waiting for a strong current. If an ordinary Morse sounder were used, such a strong current would be required that scarcely a word a minute could be transmitted, while with the sensitive instruments actually used from 40 to 100 words or more can be sent.

The first receiving instrument used was the mirror galvanometer invented by Sir William Thomson. A small magnetic needle is suspended by a fine silk fiber between two coils of many turns of fine wire. On this magnet is fastened a little mirror of silvered



glass. Whenever a current of electricity passes through the coils, the magnetic effect deflects the needle to the right or left, according to the direction of the current. A beam of light from a lamp falls on the mirror and is reflected on a screen. To represent each letter of the alphabet there is a certain combination of deflections to the right and the left. The sender of the message produces there by a reversing key, and the receiver reads them by the motion of the spot of light.

By this method no permanent record is produced, and, unless an operator is very careful and expert, mistakes are likely to occur. Sir William Thomson also invented another instrument which is more trustworthy, and which is now more generally used. This is called the siphon recorder. A coil of fine wire is suspended between the poles of a strong horse shoe magnet.

Whenever a current passes through this coil, it is deflected by the action of the magnet on the current. In a bottle of ink is dipped one end of a very small glass siphon, through which a fine stream of ink continually flows. Two threads connect this siphon with the two sides of the suspended coil, and as the latter is deflected it pulls the siphon to one side or the other. Under the open end of the siphon a ribbon of paper is moved uniformly by clock work, and the ink dropping on it traces a continuous line which registers every motion of the coil. In this way a permanent record is secured, which can easily be read by the expert operator. Below is a sample which shows how this record looks.

Since only very feeble currents are required, only a few battery cells are used, whereas on land lines many cells, or even strong dynamo currents, are employed. The use of such delicate instruments causes another difficulty which commonly gives little trouble on land lines. It has been found that currents of electricity are nearly always flowing over the surface of the earth, which become especially strong during magnetic storms, and may then cause great trouble even on land lines. These currents would utterly demoralize the delicate cable instruments if the cable were connected to the earth. To avoid this trouble two methods may be employed, one is to have a return circuit, so that the cable forms a closed look insulated from the earth. This would involve double expense in laying the cable. The second method, invented by Varley, is now generally used. In this plan, only one cable is used, but each end is entirely insulated not only from the earth, but from the electric batteries which are used to transmit the message. This seems a paradox, but it is quite simple when once explained.

The principle upon which the method works is shown in the diagram, from which all details that would be confusing are left out.

Each end of the cable is attached to one plate of a condenser C. The other condenser plates are connected to the earth by wires leading through the batteries and the receiving instruments. Let us see how a signal may be transulated. The sender closes the key K which connects the battery B with the condenser at his end of the line. If he connects with the positive pole of the battery, it will charge one condenser plate with positive electricity. This will attract negative electricity from the other end of the cable and repel positive to it, so that the cable side of the distant condenser will become charged positively. This acts in the same way on the opposite condenser plate, charging it negatively and repelling a positive charge through the receiving instrument G to the earth. By reversing the key, the sender may charge the condensers in the opposite way and every time he closes the key, an instantaneous current will flow through the receiving instrument at the other end of the line, although neither it or the cable is directly connected with the senders battery. In this way the trouble due to earth currents is entirely avoided. By a suitable combination of a number of condensers in a way too complicated to be described here, two messages may be sent at the same time in opposite directions over the same cable, without interference with each other.

From what has been said here it is plain that the expression "velocity of electricity" over a wire has no meaning. Almost instantaneously after closing the key a very feeble effort can be observed at the other end if a very sensitive instrument is used. If the key remains closed the current will gradually increase so that a few seconds much less delicate instruments will be affected. The actual time required to transmit the signal is thus seen to depend altogether on the sensitiveness of the receiving instrument.

An Electric Compass.

A New York electrician is understood to be negotiating with the Navy Department in regard to a compass of his invention, which he claims will avert all danger of collisions at sea. The compass is connected with a very powerful magnet, which is also in connection with the ship's dynamo. The moment a ship enters the magnetic field of the vessel carrying the compass, which is calculated at about six miles, the needle is deflected. The deflection closes an electric circuit, which rings an alarm bell and gives warning of the approach of the other vessel. The magnet is prevented from affecting the ship's steering compass by a fence of narrow strips of brass around the compass. The inventor says the idea sprung out of an experience of his own on board an ocean steamer. He was looking at the compass when he noticed that the needle shook and turned half way around. He asked an explanation of the captain, who, pointing to a steamer four miles off, said: "That steamer is loaded either with steel rails or canned goods, It has deflected our needle by magnetic attraction."

Women Inventors.

Significant of the times is the fact that woman is rapidly coming to the front as an inventor. Women are not only filing thousands of applications for patents on improvements in articles especially adapted and intended for their sex, but they are exercising their ingenuity in the direction of improving many of the implements with which men only as a rule are supposed to deal.

The model room of the patent office in Washington bears witness to the fact that the inventive genius of the fair sex, while perhaps not so prolific as man's, has certainly accomplished remarkable results.

The first invention in this country by a woman was in 1809 and perfected on May 5 of that year. It was a device for straw weaving with silk or thread. The name of the inventor was Mary Kies. The next invention by a woman was in July, 1815. This was a corset perfected by Mary Brush. Then came a number of years with only an occasional invention.

Lavinia H. Foy, of Worcester, Mass., was one of the early women patentees, and she has applied for patents on a great many improvements. Her first patent was issued July 22, 1892, for an improvement in corset skirt supporters, and nearly all the patents granted her have been for articles connected with the wearing apparel of women. In fact, nearly all of the early patents by women were for improvements connected with her surroundings or apparel, such as cooking utensils, picture frames, articles of dress and things useful and ornamental about the house.

A Philadelphia woman, however, started the ball rolling in the other direction by patenting an improvement in beehives, and about the same time another woman from the same city invented a mode of preventing the heating of journals or axles on cars. Still another from the Quaker City patented a railroad car heater.

Some years ago, the wife of a western man who was a general in the Union army dreamed of a lock somewhat different from any in use at that time. She awoke in the night, got up, and, taking a cake of toilet soap and a paper cutter, fashioned the lock as she had dreamed it was constructed. The next day she took it to a machinist, who formed a model from the one she had made from the cake of soap, and it was such an improvement on the locks of that time that a large firm offered a good royalty, from which she derives a fair income to this day.

An application was once made by a woman for a patent on "artificial dimples." It was rejected, however, by the commissioner of the patent office, so that any of the fair sex who now desire to experiment can do so without fear of infringement. Her claims were as follows:

"Smear a small spot on the cheek or chin with colorless shellac varnish mixed with glue. With a pencil or penholder press the flesh with the point, holding it there until the substance on the face becomes dry and hard. The stiffened indentation thus retains the exact shape of a dimple, and a little face powder carefully dusted over the "artificial dimple" will completely conceal the varnish and glue compound.

"Some care must be observed in smiling too suddenly, or the dimple may be broken. But with ordinary, gentle usage it will retain its pretty shape a whole evening, if not longer. While the dimple process is applicable to those whose faces comprise a soft, velvety or pulp surface, as then a very deceptive dimple can be produced, it is not so available for thin or bony faces, nor where the skin is very thick and unyieiding."

Another interesting and amusing invention by a woman was a crimping pin which could be used as paper cutter, skirt supporter, paper file, child's pin, bouquet holder, shawl fastener and book mark.

In 1881 a patent was issued to a Boston woman on two somewhat novel devices. One of them was for restoring facial symmetry and consisted of a spring plate with a head and two prongs or forks. The head was to be attached to the teeth, and placing the prongs inside of the mouth so that they would press outward against each cheek caused the cheeks in time to look plump and full. The other was a finger compressor made on two longitudinal concave plates hinged together at one end by spring hinges, and thus adadpted to fit the tips of the fingers, while the constant pressure reduced the size.

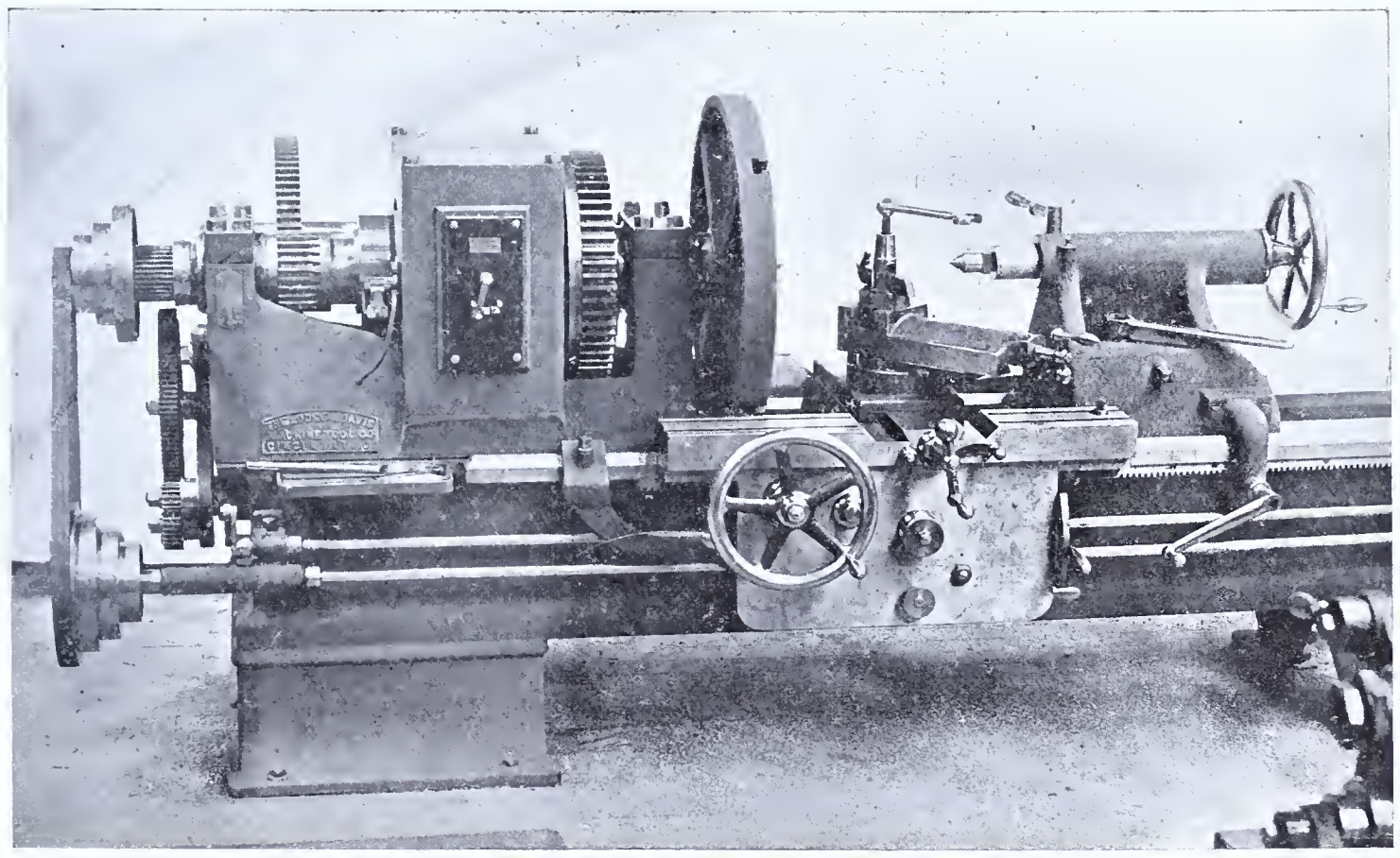
One of the inventions by the fair sex that is supposed to be conducive of beauty is a nose improver. It consists of a metal shell of the exact size of the nose desired. The nose is well bathed and then greased with olive oil or glycerin until perfectly soft. The improver is then attached and well fastened. The wearer then goes to bed. In the morning the improver is to be taken off and the nose bathed in warm water. It will probably cause some soreness, but a few applications are said to remove the pain. In this way it is claimed by the inventor any nose may be changed to suit, the theory being that the nose is only a piece of cartilage and easy to change its shape.—New York World.

Electric Power Economically Applied.

The Card Electric Motor and Dynamo Company, of Cincinnati, are meeting with unqualified success in their directly connected electric motors to printing presses, lathes and other machinery. The cuts presented herewith show these motors—one built in the headstack of a 30-inch Lodge & Davis Machine Tool Co.'s lathe, and the other attached to an ordinary printing press. In the former the motor is made upon a sleeve, which slips over the spindle in place of the ordinary cone pulleys, and in most makes of lathes takes up no more room.

All modern machine shops are equipped with traveling cranes, but in most cases the full advantages to be derived from these cranes are lost, from the fact that it is impossible or very difficult and expensive to place the tools so as to be easily served by the cranes. With a directly connected motor on each large tool, the shafting is entirely dispensed with, and the tool may be placed in the most convenient place either to receive the work or to economize space. The above motor runs at nine different speeds in either direction, from 57 to 275 revolutions per minute (the ordinary cone pulley runs at four or five) and the speed is controlled by a lever on either side of the apron of the carriage. As the position of the operator is always in front of his tool, this lever is always under his hand, and the motor can be stopped or the speed changed instantly from any speed in one direction to any speed in the other direction.

On the printing press the motor is directly attached to the main driving shaft of the press in the place of the ordinary driving pulleys, and takes up no more room. It runs at five speeds in the forward direction, and has one slow speed to back up. Any one of these speeds may be obtained instantly without any effort on the part of the pressman, simply by moving a lever on either side of the press. There are no belts to shift or generate electricity, which is so disastrous to the rapid working of the press. The electric current which runs the motor is entirely insulated, so that none of it can escape to the press; in fact, if there were any leakage to the press, the motor would be "short circuited" and would not run at all. The press runs very much more steadily with the motor than with the belt, and may be set up in the most convenient position without any respect to line shafting.

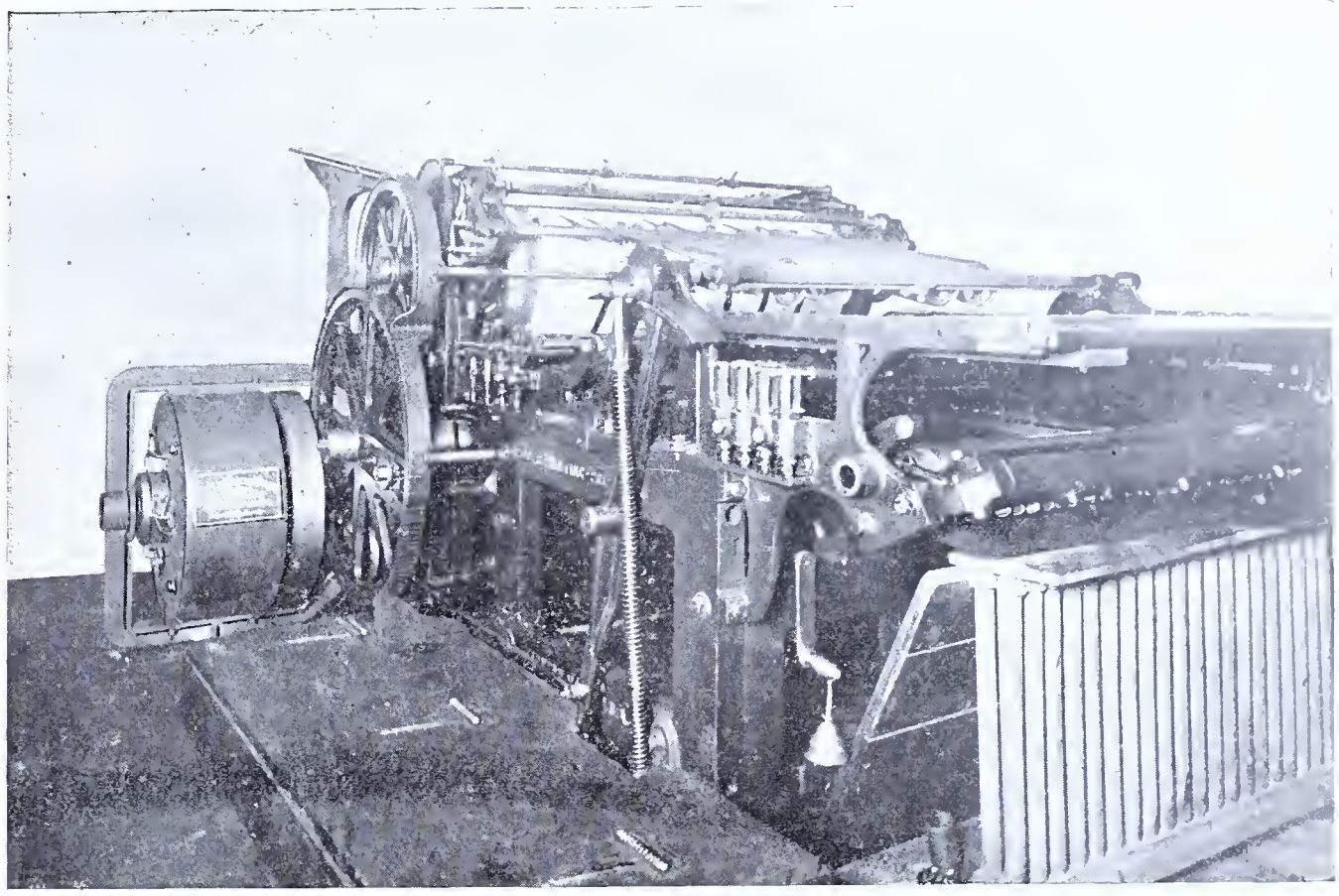


ELECTRIC MOTOR DIRECTLY ATTACHED TO THIRTY-INCH LATHE.

In Rome passenger elevators are used to ascend the buildings, but are not used to come down in. Even the upward journey is considered a luxury far in excess of the legitimate rights of mankind.

Improvement in Locomotive Engines.

If the invention which a Texas man has made does what he claims for it, it will add as much again to the efficiency of locomotive engines. At present the locomotive is driven by the forward stroke of the piston rod. Then the rod flies back again, and all the power of this back stroke is lost. To make the force of the back stroke do its work in driving the locomotive is the idea of the Texas man, and he is sure enough of the success of his idea to secure patents on it. He connects what is technically called a bell tank lever with the driving rod and also with the forward driving wheel. One arm of the lever is joined to the rod, the other to the wheel. The forward stroke of the piston rod sends the arm connected with the driving wheel up, the back stroke brings it down, and as it comes down it does its part in driving the wheel onward. The Texas man claims for his invention also that it will tend to equalize the force of the propelling steam, so that there will not be the tremendous hammer blows of the wheels upon the rails that now wear them out in a comparatively short time.



ELECTRIC MOTOR DIRECTLY ATTACHED TO PRINTING PRESS.

New Rifle Ball to be Reduced.

It is said that as the result of exhaustive experiments in actual firing the Ordnance Bureau of the Navy has determined to reduce the weight and length of the ball for the new rifle from 135 grains to 112 grains. The firing tests have shown conclusively that the lighter ball is much more accurate than the present ball, and certain other important advantages will be realized by the change. It is quite certain that the lighter ball is truer in flight, for in the experiments with it at the proving grounds shooting at a target at a distance of 1,000 yards five consecutive shots were placed in an eighteen-inch circle, and at 500 yards the same number of shots were lodged in a one-foot circle, a degree of accuracy that is far beyond that achieved with any other ball in a service weapon. The Ordnance Bureau has also determined finally to make the barrel of the new rifle of nickel steel, which will be a distinct step in advance for the United States in gun making.

The "Age" Deserving of Credit.

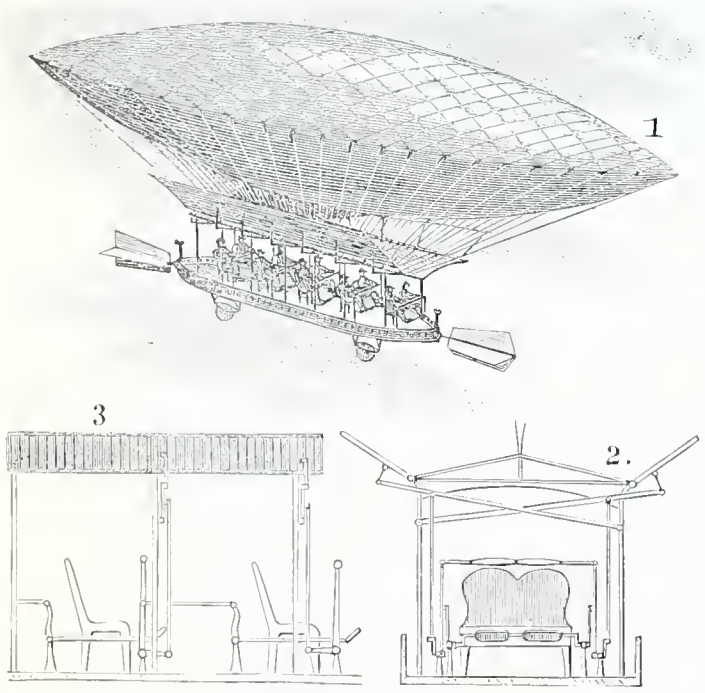
RENIFF, N. Y., June 17, 1895.

EDITORS INVENTIVE AGE: You are deserving of great credit for the warnings you are giving to inventors against the sharks who would sell patents on commission *providing they can get an advance fee of a few dollars.* The first intimation I had that my patents had been published was in receiving a letter from such a firm.

This has been followed by scores of others all offering to sell for a small per cent on commission *if the fool's money is paid first.* The very great probability is that none of them are making a business of selling patents. It is doubtful if some of them have a desk even at the address given. Their worthless recommendations are about the size of their stock. One firm that I made an investigation of their affairs through a very reliable business man who sent me a letter from one of the officers of the bank, gave them no standing at all. Anyone with common sense knows that it is impossible to travel over the territory a patent covers and sell a patent worth from $3,000 to $5,000 for ten per cent. Offer any of them twenty-five per cent without an advance fee and you provoke their ire at once. The P. O. D. should refuse them the use of the mails to carry on their fraudulent business. J. H. ANDRE.

Aerial Navigation.

Quite a number of scientists and others have taken an interest in the problem of aerial navigation. The problem is undoubtedly a complicated one. No more speed can be obtained in navigable balloons than has been acquired and this can easily be understood if we have some knowledge of physics. Let us give a few illustrations: A balloon is a "floating" vessel in air—a steamboat is a floating vessel in water. In either element the principles of physics are alike, the difference is only in volume. The required driving power must be the same for the same amount of weight in any fluid. In calm air we succeed with balloons as well as we do with steamboats in lakes. But the airy ocean is in conflict with the watery element; it is much more rapid in velocity: the wind may blow 40 and more miles an hour, and if our rivers would show the same velocity, surely no steam vessel ever could propel against such a stream. Technical improvements may help to a higher speed in ballooning, but as we never can regulate the wind, we cannot expect much more in this line. More attention is given now to artificial flying apparatus. Higher speed can be obtained on account of specific gravity. The step from a balloon to a flying apparatus we may consider rather great. It may be said that we first should get acquainted with all the physical parts, so as to prevent useless manipulations and experiments. A sample idea in recent time is the use of an aeroplane, combined with propellers.



S. SPAETH'S AIR SHIP.

Such apparatus is plainly built on a wrong basis. Who expects to attain a safe ride in equilibrium with 2,000 or more square feet outstretched surface at a velocity of 20 to 60 miles? We can manage the biggest steamship, because we have control of the power, but in aeroplanes, which are assisted by the sustaining force of an opposing breeze, control is put out of the question entirely. It matters nothing if small apparatus has made a successful flight of a few hundred feet, as long as we figure on the assisting lifting of the wind, we place ourselves completely at the mercy of the wind at the same time. These aeroplanes are designed to run against the airy current, which is not always desirable. What we want is a liberty in motion and independent of any wind, like birds. It is very doubtful whether any success can ever be expected in aeroplanes. Improvements made be made, but there is no physical foundation whatever to them.

AVIATION.

All our flying creatures have wings. Much has been written upon soaring and gliding, in which it is asserted that little or no muscular power is exerted during flight, etc. But we can see that birds are able to raise themselves almost vertically: that is, they can, on any occasion, depend on their muscular power. This arrangement secures them full possession of the air, and this we claim to be so marvelous! Certainly the birds are taking all advantage of wind and velocity, and we do the same with sails on steamships.

The bird's own lifting power is natural, and it need only be said that we should follow nature's wise suggestion and thus reach success. When we can attain to free lifting from the ground we will attain alighting without fear of danger. Some scientist said once, nature does not always give us advantages. We can go much faster on wheels than on legs. This is correct. Probably we do not require flapping wings (which are said to be so difficult to utilize), to propel warships. Propellers or screws may answer. So long as we keep within the requirements of Nature, we may always expect success. But wings, if used, will give us advantages which cannot be ignored. While flapping, they help automatically to balance and work in the same time in three directions—lifting, propelling and levelling the flight, and promise a saving of power after the start.

Propellers are comparatively not so useful and effectual and add unnecessarily to the weight. It is yet too much to say that the art of "soaring" only can be successfully practiced after the flying process is developed; flying and soaring are two different objects.

MOTORS.

The question of the supply of power for aerial purposes is still an important one. Should a very powerful and light motor ever be turned out, it can hardly be expected to carry but a few people. There is a limit to everything. The driving power (according to the weight of the same motor), has to be separated. Motors also require comparatively a strong construction of framework, etc., which adds greatly to weight, and weight is a deadly enemy to airships. There is yet a number of mechanical problems which to solve will cause some difficulty. Formal experiments have taught us that in power alone success is not to be expected. We may do well to seek assistance in some other directions. Our natural flyer is in possession of all the required power, as above stated, to hold him up in the atmosphere for hours and days. Man-power is in proportion alike, but man has to lift the apparatus in addition, which may be at least one-half to two-thirds of the operator's weight, and which would, compared with birds, be too much. Motors are still further in the rear, as their power would have to overcome their weight of iron and the apparatus and weight of passenger. Man-power is in some respects more promising as it avoids great weight and a too large construction of vessels and therefore decreases danger of breakage and at the same time a number of passengers or operators. Man-power is yet preferable to all motor experiments, as any motor, gas, electricity, steam, etc., has more or less drawbacks. We shall have to wait until we have a suitable motor and all knowledge of dynamic flight. The size of wings is in nature not always alike, for compared with a butterfly, a wild duck would need wings containing 100 square feet. The best flyers have comparatively small wings. For man, the size of wings should be selected which can be worked most favorably by his strength. Too great a size prevents control and safety. The no-plus of power or balance for entire lifting should be made up by the additional lifting power of a balloon. Such a balloon would be comparatively small and the vessel could be managed to some extent rather easily in any agreeable wind. We cannot avoid employing a balloon. In stormy weather, which attacks our sailships so mercilessly, flying machines will surely not be more controllable than a sail vessel. We may be satisfied if we have an aerial vessel which is navigable in suitable winds, safe in starting, in flight and alighting. We have no reason to believe that we never can navigate the air; it requires only the full obedience to Nature's law. We must succeed. Of a million birds not one ever will fall down, a proof which cannot be denied. If we cannot imitate the bird's art in its full details, we may be able to reach a point where we can see our way to the successful navigation of the aerial ocean.

Queen Victoria's Meals.

It is noteworthy that the queen still adheres to the old practice of having the cook's name called out at as each dish is brought to the table. This custom dates back to the days of George II, and had its origin in a conspiracy against one Weston, formerly an assistant whom the king had raised to the dignity of chief "mouth cook." His late comrades, jealous of his preferment, endeavored to disgrace him by tampering with the dishes. Upon Weston's proving the existence of this plot to his royal master, the latter gave orders that in the future, as each dish was brought on, the name of its cook should be called out, in order that praise or blame might be bestowed where due.—*New York Sun.*

The Mexican government has made a grant of $2,000,000 to a New York man to furnish rolling stock, bridges, machine shops, steam tugs, etc., for the Tehauntepec Railroad. This is an important step in the commercial progress of our southern neighbor.

Mr. Hubert Schou, of Allegheny, Pa., is the inventor of a two-part hull, with the parts held together by an overhead framework. This is outfitted with hoisting devices for the raising of sunken vessels. The invention is believed to be practical, especially in shallow waters.

Errors in the World's Patent Laws.

By GEORGE G. TURRI, F. M. I. P. A., MELBOURNE.

[A lecture delivered at the Australian Institute of Mining Engineers last annual meeting at Sallazat, Australia.]

A thousand writers have harped upon the wondrous nature of the inventive faculty. They realize that man is a creator, and that capital and labor alike are, and will always be, impotent without machinery and processes—that is, invention. What Bacon has said is echoed by them all, "the introduction of new inventions seemeth to be the very chiefest of human actions. The benefit of new inventions may extend to all mankind—they make all men happy without injury to any; they are new creations and imitations of God's own works."

My remarks will occupy another field—I will refer to some of those features of the patent laws of different countries, which prevent the use of new inventions, oppress the development of inventive genius, and diminish human happiness and progress. Wherever patent laws are framed and administered upon wrong principles, these results are inevitably found.

A concise, complete, common-sense comparison of the chief patent laws of the world cannot easily be found; but to avoid seeing scrappy, misleading references to patent law in the press—particularly the English—would be equally difficult. Writers who are considered authorities so frequently make minor issues prominent and so uniformly fail to give weight to fundamental principles, that the effect on the public is to mislead.

Amongst those in England who speak authoritatively shallow and erroneous ideas prevail. It is admitted that industrial progress goes hand in hand with a good patent law, but the latter subject is one few persons really understand.

In Australia, for example, vigorous efforts are certainly made to stimulate local industries; but we find no skilled attempt to improve the patent law, and we know no legislator who has a mastery of this subject. Under a good patent system inventors have an incentive to hard persistent labor which is necessary to evolve successful tangible improvements; but in many countries where patents are issued, we still find that inventions and industries languish, and we are driven to the conclusion that the patent laws there must be bad.

"If men," says the Hon. Charles Mitchell, of Washington, who is one of the highest of authorities, "were not induced by the rewards of a patent system to cling to their new ideas through all vicissitudes their hands would drop in discouragement."

I will treat, first, of to whom patents are given. A patent is a monopoly while it lasts. If the improvement is publicly sought after the inventor has undoubtedly a power of taxing every consumer—but it for his and their benefit jointly—which is not always the case with the power exercised at the custom house. This power has enabled a very few patentees to amass millions, and for a time to keep up prices. Anyone can find cases where the cost of material and labor on patent articles are vastly lower than the selling price. But in most cases patentees do not make fortunes, even if successful a moderate profit only is made, a profit immensely less than the benefit they confer on the public by their genius, a profit less objectionable in principal than that made by manufacturers under the system of protection.

LEGALIZED PIRACY.

In the United States no one but the actual inventor, if living, or his assignee is granted a patent. All the inventions of the world, sooner or later, become known in that country and are used if worth it, but the only persons who are allowed to secure that large reward a patent may imply are the actual inventors or their assigns.

In England it is otherwise. Suppose Mr. Wolseley, the Australian squatter, when he invented his famous sheep-shear could not then afford to apply, or through illness postponed applying, for an English patent, the English law is that any man could secure the patent rights for himself by obtaining a copy of Wolseley's specifications and drawings (available for a few shillings at an Australian patent office) and sending the same to England before any other copy got there. Had this been done before Mr. Wolseley applied he would not have been able to get a valid English patent. He would not

even have had the right to make his machines there to send to Australia. This power to secure patents for other people's inventions has been used repeatedly. The piratical patentee is officially classed as a public benefactor to England.

In 1891, Sir Richard Webster, Q. C., the Attorney-General, gave this matter anxious thought. He declared the law to be that "an importer was the true and first inventor. It mattered not whether he had stolen the invention or learned it from some third person, he was regarded as meritorious in the sense of being the true and first inventor, that the true and first inventor, if resident in England was regarded as meritorious." This decision was given in favor of a Melbourne client of my own who in his application posed as the true inventor. By the same mail steamer that took his application papers several gentlemen, who declared my client had stolen the invention from them, also traveled to England at great expense. There were three days later than my client in the filing of their application, and after much legal battling discovered that even if they had been defrauded there was no remedy, the validity of the first application was upheld. The attitude of some patent agents on this point is favorable to the English system.

At the World's Congress on Patents, at Chicago, Mr. W. Lloyd Wise, J. P., a patent agent of high character, made known publicly his opinion that it is proper to give the patent to the first introducer or importer of the invention, whether he is the inventor or not. Some assert that as it is good for the country to have knowledge brought into it of inventions, therefore, whoever introduces that knowledge first should be rewarded even if he steals it from the inventor himself. I believe the principle immoral. England is degraded by it and sinks to the level of a buyer of stolen property. If some other nation be plundered and the plunder bought to her she will pay for it. It is incredible that a civilized nation should perpetrate such outrages. To turn a deaf ear to the actual inventor is neither just nor wise, and I believe that if the public knew what the law was they would decline to uphold it. The difference of a few days or months does not warrant the state in thrusting aside the real inventor. The real first inventor may be some English citizen who, after years of toil, makes his application a day or two after an importer—possibly an alien Chinese—and because that Englishman is a day late his expectations are ruined. The British system cannot be defended by any man who knows of what miracles of thought, of labor, of patience, of genius, and of abnegation inventors are capable. Its like can only be found in those degraded countries where he who steals the cattle of some other tribe is looked upon and feasted as a public benefactor.

Before there was any patent law, patents were issued in England as a matter of royal favor. The privilege was grossly abused, court favorites and other persons were allowed in the most arbitrary way to disturb trade by monopolizing the sales of every day articles—not new inventions—such as iron, coal, and salt. Very often the royal object in issuing these patents by which the people's rights were trampled on was sordid. These patents so incensed parliament that it stepped in in 1623 with a statute declaring that no monopoly thereafter could be granted by the king, except to the inventors of new manufactures. England was not a manufacturing country then; education was backward, technical education did not exist; news spread slowly and imperfectly; books and newspapers were dear and inaccessible to the masses, an incredible number could not even read. Parliament believed that trade could be stimulated by allowing this solitary kind of monopoly to exist. When an English traveler returned from distant land, bearing the the knowledge of some important invention, and proposed to set up a manufactory in England, we call well understand why the king should grant that man a patent. The patentee paid heavily for his patent (they were not really cheapened for two and a half centuries after that) and his enterprise demanded encouragement as a benefit to the country. Enterprising persons in those days were few and far between.

It is on record that an Englishman, by artifice, secreted himself in an Italian silk manufactory and learned important trade secrets which he took to England and patented. He deserved encouragement; he did his country a service. At considerable expense and trouble he introduced a manufacture that employed thousands. He cheapened a useful commodity. In the 17th century, although the state of 1623 existed, neither the actual inventor nor the communicator of the invention making application from and residing abroad received, or would have received, a patent. England cared nothing for rewarding inventors on principle, but cared everything for encouraging industry within her own borders. The practice of giving patents to aliens, residents outside the kingdom, is a comparatively recent one.

Men's wits in those olden days were wonderfully dull. Inventors were scarce. In the year 1650 no patents were issued; in 1700, two only; in 1750, seven; in 1800, about 100; 1850, about 600—in fact, up to the new law of 1884 the number increased very slowly. In the 150 years following that statute of monopolies not much over 1,000 patents were issued, It was in the first patent law case tried after the famous Statute of Monopolies had been passed (Edgeberry *v.* Stephens, 1891) that the court held that it was the same thing whether a man claimed by virtue of brain power or by what he had learned in his travels, he was equally "the true and first inventor." But in the present day a copy of every specification of patents applied for in America and ssme other countries is sent to England by post free free of cost, and is accessible to all British citizens. On a few per cent of these a patent has been perhaps granted to the inventor himself. On a few more per cent "introducers" are allowed to secure the monopoly at a nominal cost. On the rest numbering over ninety per cent of the whole the British public acquires a kdowledge of the inventions and liberty to use them, because no patents are applied for. To be logical, the United States Government, as "introducers." should be granted English patents for about half of the valuable inventions that from time to time come to light. There is only one English judge who has ventured (and that very timidly) to doubt whether the natural common-sense definition of first inventor cannot be adopted in English law. I refer to the learned judge who tried the case of Kurtz *v.* Spence. As I shall show, the legal authorities in various British colonies have bodily adopted the common-sense interpretation of those words, but the intensity of the evil is not realized until we come to enquire whether it really does good to the country now to give the introducer a patent. Conditions have so changed in the last 100 years that this which was once a benefit is no longer so. It prevents widespread manufacturing; it is no longer a means for securing valuable knowledge otherwise unobtainable. Whether the introducer applies or not England gets the knowledge; hence the consideration the foreign introtucer offers is a sham. It would not be such a sham if every introducer agreed to manufacture the invention in England, but no such condition exist.

The English law on this point prevails in various British colonies. It prevails in New South Wales according to the official practice but that practice is due to an erroneous and hereto unchallenged interpretation (by a crown officer). The act does not name "true and first inventors," but "authors or designers" as entitled to patents.

In Queensland and Western Australia the practice is to treat the English interpretation of the words "true and first inventor" as incorrect, whilst in Tasmania and South Australia the English system is (perhaps unwillingly) treated as prevailing. The words "true and first inventor" are used in the acts of all the four colonies last-named. As to what these words mean, the court has never in any of these five colonies been referred to for its decision. In Victoria and New Zealand the American interpretation is happily and unmistakably the law. The acts state that no "unauthorized importer" may apply. The following is a complete list (omitting countries of under a million population, except Australasian) showing how the world is divided on this point. In all those countries were piracy is not legalized, if the foreign inventor wants no patent, these countries soon enough get the knowledge of the invention without any "introducer's" aid, and instead of one man only having the right to profit by these inventions everyone is free to do so.

Piracy legalized.—Great Britain, Cape Colony, Ceylon, South Australia, Tasmania, Russia, Spain, Turkey, Denmark, Columbia, Ecuador, Bolivia.

None of these British lands, but all the others in this list require the invention to be actually worked in the country otherwise the patent becomes void.

In the colonies the laws give patents to the "true and first inventor," which words have been perverted (from the natural meaning the parliaments probably intended them to have) to the meaning prevalent in Engladd. This perversion is usually due to the crown officials and some of the courts may yet decide that these words do not legalize piracy.

Piracy not legalized.—Canada, Victoria, India, Queensland, *Austria, *Portugal, France, Norway, Italy, Brazil, Argentine, Liberia, Guatemala, New South Wales, West Australia, Fiji, United States, *Belgium, *Germany, Switzerland, Sweden, Finland, Chili, Uruguay, Venezuela, Mexico.

In some of the above British countries the patent is to "the true and first inventor," but the authorities will not recognize the British interpretation of these words.

There are some countries that allow a patent to anyone holding a patent elsewhere for the same invention, but the condition that the invention must worked locally is in force also.

ANOMALOUS RESULTS.

Even with the best existing patent systems cases of hardship occur. Two independent inventors are often working on the same track and strike the same result. The poorer is frequently unable to apply promptly and skilfully for a patent and receives no benefit in many instances, whilst the other obtains the monhpoly and amasses wealth. To ensure a fair reward to inventors new legislative arrangements are essential everywhere. When a poor man does receive a valuable patent, in 19 cases out of 20 his rights are bought for a comparatively small sum by others who reap the results which were intended by the state for the inventor. Truly "one soweth and another reapeth." It is a blot on all countries that a large proportion of their inventors fail to receive fair recompense.

DOCUMENTARY REQUIREMENTS. AMBIGUITY AND FRAUD IN ENGLAND.

For a United States and Canada patent every applicant must make oath that he is the actual inventor.

For Victoria, South Australia, Queensland, and West Australia he must make a statutory declaration to that effort. To require either an oath or a declaration appears very reasonable.

In Great Britain, most of Europe, New South Wales, Tasmania, New Zealand, the applicant's mere allegation suffices, and the safegnard being removed, cases of false pretences arise without there being any legal power to punish as there is in countries where an oath or statutory declaration is necessary. It was recently proposed in the Victorian legislature to abolish the statutory declaration that at presents checks dishonesty and somewhat protects *bona fide* inventors, but the foolish attempt failed, the session closing with the patent bill amongst the slaughtered innocents.

The most importantant document every applicant for a patent must file is his description of the invention. In the United States a complete, *i. e.*, fully explanatory specification with drawings must be deposited.

A competent person reading it must be able to understand the exact scope and nature of the invention and how to work it. This rule obtains throughout the world except, I believe, in Great Britain, the Australian colonies, and a few other countries of under one million population.

The largest colonies of the British Empire, Canada, India and Cape Colony do not side with England. If an invention is not clearly defined and complete in a man's mind he cannot completely specify and show it as a workable improvement. and yet in England he is allowed at that early stage to apply for so huge a thing as a monopoly. A provisional specification may be lodged which may be, ond often is, a document so indefinite (no drawings accompanying it) that no one could by reading it realize the invention and put into practice.

A great objection to provisional specifications (not yet prominent in Australia) is that such specifications are made use of for purposes of fraud. In England they are notoriously so used. Every provisional specification is in due course followed by a complete specification which must be filed at the patent office within nine months (or by permission ten) after the provisional has heen filed. Suppose A and B, strangers to each other, devise similar inventions; suppose B's was invented before A's and is also slightly difierent, and will succeed while A's will fail. A files a provisional specification a week before B, when six or eight months months have passed, B, anxious to secure his title, files his complete specification, which is accepted and opened to public inspection; A sees it, and at once incorporates B's idea into his own complete specification which he then files, and then A's application is also accepted. The consequence is that pattents for the same thing are issued to a A and B both dated with the date of application. A's is therefore dated a week earlier than B's. By legal proceedings A then can compel B to cease manufacturing or pay royalty. B might spend large sums knowing nothing of A, who would probably lie in wait for some such opportunity. A (according to law) is the first inventor and he can have B's patent declared void. If English patents bore date from time of issue (as in the U. S. A. and Canada) frauds of this kind would be impossible as a general rule.

There are, unquestionably, persons who systematically file vaguely drawn up provisional protection applications with the object of thus appropriating the inventions of others, and they sometimes succeed. To name one or two authorities, Mr. Lloyd Wise, who once supported provisional protection strongly, now declares that it seriously retards progress and opens the door to fraud. Mr. Boult, of London, says "It is a quite common practice for applicants to boldly appropriate the ideas of other inventors. Mr. I. Imray strongly opposes the system of provisional protection and cites provisional specifications which are utterly unintelligible to any human being as having been allowed to stand.

It is true the British patent office examiners are supposed to insist on conformity between provisional and complete specifications, but they cannot prevent frauds since, according to law, great latitude in introducing modifications is allowed. The British system treats the date of application as settling the question of first inventorship and thus great injustice although it saves much litigation. The

*In these and other countries other than the inventors may become patentees, but their title is unsafe unless they hold the actual inventor's authority.

American authorities will go right back and accept whatever date the inventor can substantiate by evidence as the date of invention, and when two inventors clash they rake up ancient models and old-time diaries and letters to establish their facts, Here again the American system seeks to reward the really first inventor, upsetting even an actual patentee for his sake, whilst the English and Australian system cares nothing for the real inventor's reward—the first applicant is rewarded, and the first inventor (if not the first applicant) must go empty away.

In a contest between an American citizen and an outsider the former is favored in being allowed to "date back" to an extent never permitted to the other.

I think it is clear that provisional specifications must be swept away, and when that is done the system of caveats operative in the United States, Canada, and elsewhere should be introduced, giving as it does a kind of provisional protection without the drawbacks incidental to provisional specifications. I know that in Switzerland and the Argentine provisional protection is granted, but vague, indefinite provisional specifications, such as would pass in England, are not legal.

PVTENTS INDISCRIMINATELY GRANTED. INSECURE FRAUDULENT MONOPOLIES.

I have not yet alluded to the rock upon which the British patent system must shortly break up, to be superseded by the adoption of the system prevailing in the United States. For forty years the United States tried the English system, and then abolished it as a total failure.

Of course a great many of the requests are identical with some request that was made before, although the applicants don't know it. If they did they would naturally not apply. The government knows it, however, for it keeps a careful record. A patent if granted is in one sense simply a piece of property like the title deed to an estate. Once government has, to the best of its belief, given a particular property away it ought to be careful to avoid the appearance of placing anyone else in possession of the same rights.

The English patent office receives now about 25,000 new patent applications yearly. In England, however, without taking the trouble to examine whether the inventions are new, if the formal parts are right every potent or protection applied for is duly granted. I will explain what that means. If anyone writes a description of a common wheelbarrow, and claims the exclusive right to sell that implement, the British patent office would accept the fees and grant letters patent to prevent every citizen using a wheel-barrow except by the patentee's permission. Honest citizens could then be harassed. Their only remedy would be to take legal steps to cause the patent to be declared void. Take another illustration. If a man applied for a patent twice over for the same thing, and in the same words, he would get both. The invention might be valuable, and then one patent could be sold to one person and the other to someone else, the crown ratifying the fraud to all appearances by duly registering both transactions. Opportunities are thus given by the crown for imposition and and frauds upon the nation. The British system is rotten to the core. A man actually applied for a patent for perpetual motion not long ago, and the thing was a gross absurdity, yet the patent issued. The document issued by the Queen looks imposing with its official seal, and as the popular belief is that the patent would not have been granted if the patentee's claims were invalid, imposition is easy. The patent deed merely recites, however, that because A claims to have a new invention and ddsires a patent, the same is issued. The document does not admit A has any real rights, but unless the invention is proved not to be new the patent is valid, and the nation must pay tribute to A. Such a document is very useful, and much in demand, but it is royal blackmail all the same. The government makes a huge profit by the annual taxes it collects on its go-as-you-please system of issuing patents. It enables wealthy patentees to extort money from poorer manufacturers, or to harass and impose upon the public, but it fails to enable poor inventors to gain credit from well informed capitalists, who at once question the legality of the monopoly and thr novelty of the invention. Surely the very first question to be decided about any alleged new invention is, Is it really new? And surely so far as its novelty is not investigated the state does wrong in enforcing a monopoly for it, which cannot be upset except some citizen burden himself with the work and expense of investigation, and of proving the invention old.

Before risking thousand of pounds in developing a patent, a capitalist should have some assurance that he will not be infringing on the rights of someone else who has an earlier patent. The British crown refuses to give that assurance. The exploiter has a right also to be assured that if anyone copies his manufactures the infringer can be restrained by law, and that the patent will not be found a trap for its owner's ruin, Now English patents are such a trap much oftener than the American. Mr. Clement Higgins, Q. C., London, said to me some years ago: "I see you call attention to the danger of an incomplete examination into novelty" (such as occurs in the British patent office). "With this I entirely agree, as it seems little better than a trap to those who expend money on patents, believing such exominations to be reliable." No one believes in the English system as it stands. One distinguished patent agent candidly avers that the less examination there is the better for the agents, but I believe this statement is only half true. It may be so for agents deficient in skill and experience, but for first-class agents the higher standard of work required under the system of examination must mean higher emoluments.

Mr. Lloyd Wise and some other authorities would merely patch up British law by having a record somewhere or other (not attached to the deed. which they propose should still be issued even if invalid) bearing a reference to whatever evidence of prior publication the examiners could find; but this scheme would fail utterly to protect the public, because people would seldom search the patent office or submit the specification, with its cunningly devised and highly involved phraseology, and the other specifications, etc., the examiner cited, to barristers and patent agents for their opinions as to what the patent really amounted to. All this would be too expensive.

Many members of the Chartered Institute of Patent Agents, London, prefer the American patent system, as I do, and as the Manchester and other important British Chambers of Commerce do.

An English patentee, having no security in his property, finds it hard to make arrangements to work his patent or induce others to work it. If he starts manufacturing under it, a prior patentee may any day swoop down upon him for damages: or if he brings actions against other persons who infringe what he calls his rights, he may find himself ruined by the law court, which cancels his patent, and, when it is too late, gives him the very information he had a right to expect at the beginning.

Every capitalist and every inventor has much to lose by the policy of issuing "depreciated" patents. They want to hear government say: "We have rigidly investigated this inventor's claims, and we have attached to the patent deed an exact description of what he has been found entitled to, and our investigation discloses no flaw in the validity of this title." No copy of the specifications is attached to the patent deed in England or any of the Australian colonies, except New South Wales; but in the United States, Canada and Europe generally it is always attachtd to allow persons who see the deed to perceive exactly what it covers. This checks fraud, and some people are very bare-faced in representing his patent to cover something entirely different from what it actually does cover.

Before me is an American patent. It reads thus: "Whereas upon *due examination made, the claimant is justly entitled to a patent under the law.*" There is the point. It is emphatically stated that due examination into novelty has been made, and the whole authority of the Republic is given to the assertion that the claimant has been found justly entitled to hold that monopoly, which the deed then proceeds to give. Quite the finest and most perfect technical library in the world, that at Washington, is ransacked before the conclusion is arrived at. Every patent application is placed in the hands of the examiner, who has had years of experience at his work, and is (so far as the salaries Congress allots permits) a highly educated expert who limits his attention entirely to inventions in one field—the examiners and their assistants number altogether over 200—and all the claims that cannot be substantiated as new are carefully eliminated, and those incorrectly set forth are made accurate. When the patent is issued by the Commissioner it is in a form that (barring exceptional cases and errors, not in the system, but in the machinery for carrying it out), invariably secures general respect throughout the country as being valid and unimpeachable. Capitalists regard United States patents as excellent fields for expenditure, without casting doubt on the legality of the grant; press comments arising from exceptional cases notwithstanding. Naturally enough, human beings being but human, patents are refused sometimes that ought to pass, and *vice versa*, but the system is right, and the proportion of such cases to the whole is infinitesimal. Brother Jonathan has an inexpensive system of appeals against an adverse decision from one authority to a higher, then to a still higher, and lastly to one higher again. This enables practically perfect decisions to be secnred. While nearly 40,000 applications for patents were made in the United States in 1892 less than 24,000 were granted, and the proportion refused or withdrawn as lacking sufficient novelty to be valuable I estimate at 30 per cent. How much better it is for the *bona fide* patentees to have all the bogus proposed patents swept away and rendered harmless? Perhaps my opinion alone will fail to carry convincing weight. But the opinion of the Hon, Charles Mitchell, a recent Commissioner of Patents in the United States, America, ought to settle the matter. What he says is this: "The importance to inventors of the system of preliminary examination has been declared to be inestimable. It places at the service of the humblest inventors the services of trained experts in law and mechanics. It makes a patent something more than an assertion of right. It bears testimony that it has been compared with prior patents and applications, that the device is what it professes to be, a new departure in the arts. Thus the patent acquires an immediate commercial value, a value which is enhanced just in proportion as means are supplied by the government for making an enquiry as complete and exhaustive as it is in human power to make it." I might add that a recent president of the Chartered Institute of Patent Agents in London declared that he had known cases of English patents that had proved exceedingly valuable, and which would undoubtedly have been obtained in an invalid form, but for the information derived from the American patent office objections. It is painful to think of a British patentee saying: "I owe my prosperity to having ascertained what the Americans had to say before I completed my British patent. Had I first divulged my invention In full in my own country, and received a patent on that, it would have been found worthless." Nobody expects the American system to abolish ruinous litigation, for wherever prosperity rights are involved, not only patents but any other kind, it is man's nature to enter into litigation about them. English patents are not so much relied on, and when the owners come to investigate and find their titles befogged or shaky they often keep their patents out of court, or abandon their enterprises, or when infringements take place they remain inactive. I will not attempt to compare the patent litigation in England and in America. It is heavy in both, but in the latter the interests involved are generally more valuable, inventors are more assertive of their rights, and pirates more daring in their infringements. Year after year, too, the American patent office has been undermanned and crowded into insufficient space. The Commissioners have annually complained that the pace at which the examiners are forced to work must interfere with the quality of their decisions. This is the real all-sufficient cause for the principal defects in the working of the United States system, but British writers, and Americans, too, nsually overlook it, and launch their diatribes most unjustly at the law itself instead of demanding better administration down to the smallest details.

Official examination into novelty made.—United States, Canada, Germany, Switzerland, Norway, Denmark, Sweden, Chili, Brazil (some inventions), New South Wales, Victoria, Queensland, Argentine Republic.

Official examination into novelty not made.—Japan, Great Britain, Russia, Portugal, Spain, Austria-Hungary, Belgium, Italy, France, Finland, Turkey, Tunis, Mexico, Bolivia, Ecuador, Venezuela, Columbia, Guatemala, Ceylon.

Examinatioe into novelty is optional with the officials.—Cape Colony, India, South Australia, West Australia, Peru.

All countries with under one million population are omitted, except some Australian colonies.

Australia is decidedly on the Uuited States side. Colonial libraries are smaller, and the examiners fewer and worse paid than in the United States. Hence the results of examinations are not very reliable. but nothing is refused unless evidence is found against it, so that the patentee gets the benefit of any oversight, if benefit it can be called. In a measnre the same thing is true of all countries where there is an examination—the applicant receives the benefit of any doubt—and this single fact proclaims tnat the examination system is just, even to indulgence. When we have Australian Federation there will be but one examination for all the colonies, and I have no doubt that by uniting the examining staffs of the various colonies, a body will be formed well able to acquire as high a reputation for excellent work as the United States examiners enjoy.

In England, all Australasia (except New South Wales) and other British territories where the patent law is not antiquated, every complete specification is when "accepted," laid open to public inspection to enable objection (if any) to be made and decided prior to use of the patent. This is done in the United States, Canada, nor Europe generally. In most leading countries of the world the specification is kept secret until the patent has been issued. It is possible some objection might exist under the English system pointed out immediately the speeification was seen, and prevent a wrongful patent issuing. In countries where specifications are kept secret until the patent issues this advantage is lost. Errors in specifications of issued patents can sometimes be set right afterwards, but this is troublesome, expensive, and in other ways unsatisfactory. All patent offices should therefore follow the English practice in the above matter, and so uphold the principle that prevention is better than eure.

NEW PATENTS FOR SALE.

Advertisements inserted in this column for 20 cents a line (about 7 words) each insertion. Every new subscriber sending $1.00 to THE INVENTIVE AGE will be entitled to the AGE one year and to five lines three times FREE. Additional lines or insertions at regular rates.

FOR SALE.—Patent No. 512,629. Rocking Churn. I have sold the right to three western states for $7,000; will take $5,000 for remainder of U. S. Large profit for manufacturers. For full particulars, address, Col. G. H. Smith, Webster, W. Va. 6-8

FOR SALE.—Patent issued April 30th, 1895; a regular gold mine for somebody. It is a flax thresher and can be attached to a common harvester; it will thresh and clean the the flax at the same time as cut, with one operation. It has been tested and is a complete success. Will sell or let it be manufactured on royalty. For full particulars, address, T. O. Helgerson, Volga, South Dakota. 6-8

FOR SALE.—Patent No. 536,653; Non-defacing Shade Roller Bracket; no screws, no nails, quickly fastened. $5,000 or make royalty offer. Also Canadian and English patents. Clinton W. Raker, 37 W. Sunbury St., Shamokin, Pa. 6-8

FOR SALE.—Patent No. 492,016; Potato Digger and Screen combined. Will sell at a reasonable figure. Address, E. A. Hoffman, Del Norte, Col. 6-8

FOR SALE.—Something good—Mowing Machine Knife Bar. This bar is so arranged as to hold the knives and Pitman eye with one bolt. For particulars address Z. E. Wiseman, Vadis, Lewis Co., W. Va. 4-8

FOR SALE.—Patent No. 454,254, on toy belonging to the "puzzle" family. A fine opportunity for some person or novelty manufacturer. Only $200 and royalty if taken at once. Max Cohn, 828 Vliet St., Milwaukee, Wis. 6-8

FOR SALE.—Patent No. 553,472. A device for tallowing culinary vessels for cooking purposes. Will sell on a royalty. Address, M. Kratky, Hemingford P. O., Nebr. 7-9

FOR SALE.—Patent No. 512,096. Derrick Hay Loader. Does away with cart. Puts whole cock of hay in a desired position or height on wagon with grappling fork. Address, W. C. Card Meade, Mich. 7-9

FOR SALE.—Half interest in my patents No. 525,039, for the United States and 47,893 for Canada. Collar Button Clasp and Shirt Combined no collar button in neck band. A very valuable invention. A quick seller with large profits. Full information given on application. Address J. B. Wolgemuth, Mitchell, South Dakota. 8-11

WANTED.—Someone to patent, for half the patent right, a cheap and simple device for fastening ropes around trunks, etc., etc. Substitute for leather straps. Address Carl Gunderson, 441 4th Street, N. E., Minneapolis, Minn. 8-8

FOR SALE.—Patent No. 539,810, issued May 28, 1895; Portable Oven. Can be placed on cook, range or gasoline stove, and will bake from 8 to 10 loaves at a time. Makes easy work for women, and is easy handled. Takes but one-fourth of the fuel and gives comfort in the kitchen. Has been fully tested and gives satisfaction. They can be sold from $2 to $5. For full particulars address Abraham Harnish, Buyerstown, Lancaster Co., Penn. 8-8

FOR SALE.—Electric Heater Patent, No. 512,797, January 16th 1894, and improvements. The most economical and efficient car heater ever offered. Will sell entire, or part interest, and superintend manufacture if desired. Will take stock in a good company as part pay. Address Wm. J. Bowen, Electrician, Norwalk, Ohio. 8-10

FOR SALE.—Coin Operated Automatic Newsboy, containing patented device for rejecting spurious coins. Effective machine cost five cents. Will sell right to use to parties not in competition. Address to M. M. Tomblin, Rockford, Illinois. 8-10

FOR SALE.—Patent, Patterns and Cuts of my Fence Machine; a success, and a good investment for small capitol. Send for circulars. W. H. Mason, East Monroe, Ohio. 8-10

FOR SALE.—Patent No. 537,341. Patented April 9th 1895, an Adjustable Rein Support. Will sell outright state rights or on royalty. Indispensible especially during fly time. J. F. Evins, Blodgett, Mo. 8-10

FOR SALE.—Outright or on royalty, my patent U. S., No. 540,322 and Canadian No. 47,856, being a supplemental stopper for ink bottles, (rubber) designed for use in schools, to prevent the spilling of ink. For particulars, address Helen Leadbetter, Kincardine, Ontario. 8-10

"BUBIER'S POPULAR ELECTRICIAN" is the name of a monthly publication which contains a vast amount of valuable information on all electrical subjects. Its department of "Questions and Answers" will be appreciated by students and amateurs desiring information or instruction on any problem that may arise. THE INVENTIVE AGE has made special arrangement whereby we can supply that popular dollar journal and THE INVENTIVE AGE—both publications one year—for $1.50.

BUSINESS SPECIALS.

Advertisements under this heading 20 cents a line each insertion—seven words to the line. Parties desiring to purchase valuable patents or wanting to manufacture patented articles will find this a valuable advertising medium.

WANTED.—To hear from parties with capital, interested in developing a valuable invention of merit. For further particulars address George C. Stanton, New Iberia, La. 5tf

WANTED.—Manufacturers or capitalist who wish to pay all expenses for an interest in the patent for a meritorious invention to be patented. Address, George C. Stanton, New Iberia, La. Correspondence solicited. 3tf

WANTED.—To manufacture on royalty, household inventions. Send specifications and if models are sent prepay all charges. Galpin & Hanley, Binghamton, N. Y. 6-8

R. U. asleep? Listen! We'll pay U $5 for every new student, who pays entire tuition in advance. Milwaukee Correspondence School of Practical Bookkeeping, 828 Vliet St., Milwaukee, Wis. (13 years practical experience.) 6-9

WANTED.—A partner with $800 to patent and place upon the market a useful small article that sells quickly in every family at 150 per cent profit. Address Wm. J. Bowen, 28 State street, Norwalk, Ohio. 8-8

WANTED.—A firm to manufacture on a royalty my dusting cloth holder for broom handle. No competition. Inexpensive to manufacture. Patent No. 538,269. Correspondence solicited. Address, H. Neagles, Lynn, Mass. 8-10

WANTED.—We have work for a short time for one draughtsman in each town. Address J. H. Snow & Co., Mechanical Engineers, Indianapolis, Ind.

WANTED.—A reliable firm to manufacture and sell a game on royalty, patented by me in this country, Canada and Great Britain. Address Lieut. H. H. Sargent, 2d Cavalry, Regimental Quartermaster, U. S. Army, Fort Wingate, New Mexico. 8-10

Electric.

THE Chicago & Northern Pacific will equip Chicago suburban service of its lines with electricity.

OTTAWA, Canada, is a city of but 40,000 people, but its inhabitants pay for over 50,000 electric lights.

THE government printing office is to be equipped with electric lights and electric motors will take the place of steam engines for light machinery.

The sale of the Youngstown (O.) Stamping Works to Ensign Brown, representing the creditors' committee, for $13,000, has been confirmed. The new company will make a number of improvements in the plant.

MR. E. CLARKE, architect of the Capitol, has ordered an electric call system for use in the House of Representatives, by means of which pages will be summoned as required, from an anteroom, with which each desk will be connected.

THE success of long distance transmisson of electric power was again demonstrated on the 14th of last month when the current generated by the falls of the American river at Folsom, twenty-four miles away, was turned on at Sacramento, Cal., and street cars were sent humming through the streets in every direction.

A NEW YORK company has placed upon the market a device by which the current supplied to incandescent lamps may be so graduated as to afford any desired shade of brilliancy. The saving at the meter is said to amount to 69 per cent, and the convenience of the appliance for use in private dwellings, hotels, hospitals and steamships is readily appreciated.

THE Sheffield Coal, Iron and Steel Company, capital $750,000, composed of Pennsylvania and Tennessee capitalists, has been organized Sheffield, Ala., and has acquired blast furnaces with a capacity of 450 tons a day, 70,000 acres of mineral lands, 300 coke ovens at Jasper, Ala., and the Gumble and Carbon Valley coal mines. John Fritz, of Bethlehem, Pa., is president of the corporation.

THE daily record of an engine's performance is of great value to the engineer, affording him an opportunity to at all times observe and determine the condition of his machinery. Howard Challen, of New York, is the publisher of a inexpensive but very complete Engineer's Log Book, ruled and printed across two pages, giving the month, day of week, average pressure per gauge, hours run, revolutions, vacuum per gauge, piston speed (feet per minute), indicated horse power, initial pressure per indicator, terminal pressure, water per H. P. (lbs), fuel burned, ashes and waste, oil and waste used, etc. Memorandum space is also left for record of repairs, defects, etc, For sale by Bretano, Washington.

THE INVENTIVE AGE can recommend the "Climax" watch, advertised in another column, as being, undoubtedly, the best stem-winder watch for the price in the market. It is a good time keeper, and either a plain or imitation engraved cases can be had. This watch is fully timed and regulated and fully guaranteed for one year, the same as Waltham or Elgin.

Aftermath.

DURING the past year 682 steam and sail vessels of 132,719 gross tonnage were built and documented in the United States.

THE J. W. Bryant Company has been incorporated with a capital of $40,000 to manufacture a papier-mache bicycle rim.

A COTTON mill is to be built at North Adams, Mass., which will employ over 1,000 people, will have 80,000 spindles and 2,100 looms, and will cost $1,000,000.

CONSUL MCDANIEL, of Bahia, Brazil, says that a cotton factory is now building at that place which will be the largest in Brazil, being 900 by 275 feet, with 2,000 looms.

THE American Cereal Company estimates that the consumption of oats will be decreased 100,000,000 bushels, because of the displacement of horse power by bicycles and electricity.

The Pittsburgh Steel & Iron Co., which has purchased and will operate the Moorhead-Mc Cleane plant, has elected Col. James Andrews as president and treasurer, and C. F. Stuart as vice president and general manager of the works.

At Benwood, W. Va., 400 employes of the Wheeling Steel & Iron Co. asked an increase in wages. The men at the Benwood plant of the Riverside Iron Works recently received an advance and the demand now made is for a corresponding increase.

The Ashland Iron & Steel Co. is building a dock at Ashland, Wis., so as to load pig iron directly on vessels from the furnace. It will extend 2,000 feet into Chequamegon Bay, and a gravity track will run from the furnace.

THE E. P. Allis Company recently made a voluntary raise of 10 per cent in the wages of their workmen, numbering about 1,600 to 1,800. It is estimated that fully 10,000 men have been affected by the increase of wages in Milwaukee.

THE case of the great Peralta grant, situated in Arizona and New Mexico, and covering 12,465,000 acres of land, which has been on trial for three weeks, was decided June 25 in favor of the government. The court held every title paper to be forged and manufactured.

WORK was begun a few days ago on number five shaft of the Tamarack mine at Calumet, Mich. The shaft will extend vertically almost one mile into the earth before striking the copper lead. It will require four years, working day and night with dynamite, to reach the vein.

ON account of a rush of orders for steel plate the Illinois Steel Company will double the capacity of its open-hearth plant. Work has already begun on the foundation of the new building, which will be of brick, 300 feet long. The plate mill now employs 600 men, and many more will be required. All but one of the blast furnaces are now running.

Alexander T. Brown, the well-known inventor of the Smith Premier Typewriter, says the *Syracuse Herald*, has invented a new system for electrical exchanges for telephone service, by which instantaneous communication can be made with 900 different subscribers' stations and each subscriber, through the aid of the simple connecting register, is given absolute control of the central office connecting mechanism, so that he makes any connection he desires without delay. A striking peculiarity of the system consists in the fact that the intercommunication is absolutely secret, no other subscriber can break in or interrupt the conversation. No batteries are employed for operating the connecting register. The source of electric energy is placed at the central station, and it really seems as though everything is accomplished by this apparatus that it is possible to accomplish with the most improved form of the manual switchboard. Furthermore one can set his indicator on the desired number and start the register, and, in case the bell does not respond immediately, he simply goes about his business and waits until it rings, a great saving of time over the present method.

A Chance to Make Money!

The times are hard, but there always seems to be opportunities for those who are willing to work. In the past month I have made $175 above all expenses, selling Climax Dish Washers, and have attended to my regular business besides. I never saw anything that gave as general satisfaction. One should not complain where they can make over $6 a day, right at home. I have not canvassed any, so anxious are people for Climax Dish Washers, that they send after them; any lady or gentleman can do as well as I am doing, for any one can sell what everyone wants to buy. I think we should inform each other through the newspapers of opportunities like this, as there are many willing to work if they knew of an opening. For full particulars, address the Climax Manufacturing Company, Columbus, Ohio. After you have tried the business a week, publish the results for the benefit of others.

INVENTIVE AGE BUILDING.

PREMIUMS TO SUBSCRIBERS.

Read the following offers to new subscribers:

OUR $1 OFFER.

THE INVENTIVE AGE one year and two copies of any patent desired, or one copy of any two patents..... $1 00

THE INVENTIVE AGE one year and a list of 50 firms who manufacture and sell patented articles..... 1 00

THE INVENTIVE AGE one year and Altograph map of the City of Washington 1 00

THE INVENTIVE AGE one year and a five line (35 words), advertisement in our "Patents For Sale," or "Want" column, three times..... 1 00

For $1.

THE INVENTIVE AGE and any one of the following Scientific books:

How to Make Electric Batteries at Home, fully illustrated, by Edward Trevert.

Everybody's Handbook of Electricity, illustrated, by Trevert.

How to Make a Dynamo, by Trevert.

Practical Directions for Electric Bell Fitting and Electric Gas Lighting, by Trevert.

Elihu Thompson's What is Electricity?

OUR $1.35 OFFER.

THE INVENTIVE AGE one year and Joseph Allen Minturn's famous book "The Inventor's Friend," indorsed by such high authorities, as Dr. Gatling, Clem Studebaker and others.....$1.35
Book alone 50 cents.

THE INVENTIVE AGE one year and any one of the popular and instructive books as per offer in another column, under heading of "Popular Scientific Books."..... $1.35

THE INVENTIVE AGE one year and any one of the "Excelsior Edition of Standard Poets," mentioned elsewhere in this magazine..... $1.35

THE INVENTIVE AGE one year and a copy of "Picturesque Washington," 200 pp., 136 illustrations, Stilson Hutchins' famous book, former price $2, sent to any address in the United States..... $1 35

THE INVENTIVE AGE one year and The Peoples' Atlas of the World, one of greatest bargains ever heard of; size of Atlas 14 x 22 open; latest maps and statistics; handsomely illustrated, a $2 book with AGE one year—both for.... $1 35

☞ See another column for other offers.

OUR $1.50 OFFER.

THE INVENTIVE AGE one year and Robt. Grimshaw's famous book "Tips to Inventors"..... $1 50

Address all communications to
THE INVENTIVE AGE,
Washington, D. C.

Cantwell & Company, Patent Agents, Calcutta, India.

We have received from this well-known and long established firm in the east their handy little phamphlet which deals fully with the laws and regulations appertaining to the taking out of Patents and registering of Trade Marks in India and other Eastern countries. It will be found a very useful adjunct to the file of Patent Agents in this country and more so to those in this city, the headquarters of the fraternity. The manual contains a list of charges which we think are very moderate, and, which will we feel sure fill a long felt want in that direction.

A junior member and representative of the firm, Mr. Harry Cantwell, is at present in this city which he proposes to make a permanent residence.

All communications to him with reference to any information regarding Patent Practice in the East may be directed in care of the Inventive Age office, Washington. We may add that the above firm are the sole agents for the "Inventive Age" in India, British Burmah and Ceylon.

Want a Fountain Pen?

One of the very best in the market, a standard article, warranted, will be sent as a premium with THE INVENTIVE AGE. The retail price of the pen is $2.75. We will sendthe AGE one year and the pen for $2.75.

SUPPLEMENT.==Tips to Inventors.

The Infancy of Invention.

As capital is constantly being invested and expended to protect and preserve capital previously expended and invested in various enterprises all over the land, so will inventions continue—their variety and multiplicity being demanded to further the usefulness and perfection of inventions previously originated.

It was Edison who, replying to the question, "Do you think that the inventions of the next fifty years will be equal to those of the last?" said: "I see no reason why they should not. It seems to me that we are at the beginning of inventions." The truth of this prediction is illustrated in the many useful and wonderful achievements of Mr. Edison's own laboratory since giving utterance to this statement only a short time ago.

Profits from Invention.

The value of an invention is determined by no fixed rule. Fabulous sums have been made from simple and novel, as well as complex and useful, inventions. It is a fact that four-fifths of the business of the United States is transacted by the use of inventions. The benefits to mankind because of inventions, are so manifest and so common we are apt to look upon them in a matter-of-fact sort of way and fail to give the inventor the credit due him. In the majority of cases, however, the failure of an inventor to reap a reward is attributable to his own negligence, lack of forethought and indiscretion.

Nearly every human being is an inventor, but only a few obtain a *monopoly*—a patent—on the product of their brain. There are thousands of really useful articles, appliances and discoveries, in use every day by millions in all walks of life, that might have been patented had the inventor possessed the business sagacity that has actuated his more fortunate neighbor. Take for instance the open slot necessarily used in all conduit electric, or cable street railway systems. The inventor failed to get a patent on the idea and a fortune missed him.

There is money in inventions, but not always for the inventor.

The only way to make money out of an invention is through the protection afforded by a patent; not a patent in name only, but a *good patent*—one that is intelligently drawn, with claims commensurate with the scope and importance of the invention.

The profits arising from inventions in the electric field during the past twelve years have been simply astounding. In railway appliances, bicycles, typewriters, telephones, cash registers, slot machines and farm machinery, the field has been equally remunerative. And just think of that simple toy "Pigs in the Clover"—it netted the inventor, whose friends laughed at him for obtaining a patent on so simple a toy, over $150,000. The inventor of the metal plates to be attached to the worn heels of shoes (for sale in all cities) realized a fortune out of it amounting, it is said, to nearly $1,000,000. Perforated wooden seats for chairs and rubber tips for lead pencils brought the inventors big results. Howe made a million dollars from his sewing machine attachments, and the inventor of that simple lamp attachment, the inverted glass bell, to be suspended over lamps to protect the ceilings from being blackened, made the inventor rich. The "Darning Weaver," a device for repairing stockings, is a useful invention and is netting the inventor a handsome revenue on royalties. The wire nail and gimlet-pointed screw are fortune makers, and wire nails caused the invention of automatic machinery that manufacturers them so cheaply it does not now pay the carpenter to spend his time in picking a nail up when it drops, if it requires ten seconds to do so. The inventor of the well-known "safety pin" lived in luxury all his life, after discovering a means of concealing the point of a pin in such manner as to prevent scratching. The inventor of roller skates made nearly a million and the inventor of the needle-threader for a long time made $10,000 a year.

Relation of Capital to Invention.

Mr. Edward P. Thompson, one of the most entertaining writers on the subject of invention, says that "every invention, before the introduction into practical use, passes through two stages; namely, mental and physical"—mental when in the mind of the inventor only, and physical when the mental invention is put into bodily form by hand, or by hand with the assistance of a convenient tool. "A mental invention," says the writer, "sometimes does not become a physical invention because the inventor lacks money, technical knowledge or diligence. Such a mental invention often becomes a physical invention by the assistance of a capitalist, an educated person, or diligent companion." This being true the *mental* inventor, the person who, for lack of means possibly, would fail to make his invention a physical reality—such a person should take into his confidence a friend or companion to share the prospective benefits of his invention. Thousands of meritorious mental inventions are never worked out because of the over-timidity of the inventor, his exagerated greed for *all* the benefits to accrue instead of half the loaf, which in many instances is, or would have been, ample reward. Mr. Thompson truly says: "Inventors and capitalists should be more willing to co-operate. It is too often the case that the former must pay for his own experiments and all patent costs before a capitalist will even take the trouble to look into the merits of the alleged invention. On the other hand it is too often true that the capitalist seeks to join with the inventor, but the latter wants too high a price at the beginning."

Who Can Apply for Patents.

Patents are issued to any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or new and useful improvement thereof, not known or used by others in this country, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned; and by any person who, by his own industry, genius, efforts and expense has invented and produced any new and original design for a manufacture; any new and original design for the printing of fabrics; any new and original impression, ornament, pattern, print or picture to be printed, painted, cast, or otherwise placed on or marked into any article of manufacture, or any new, useful and original shape or configuration of any article of manufacture, the same not having been known or used by others before his invention or production thereof, nor patented or described in any printed publication, upon payment of the fees required by law and other due proceedings had.

If it appears that the inventor, at the time of making his application, believed himself to be the first inventor or discoverer, a patent will not be refused on account of the invention or discovery, or any part there of, having been known or used in any foreign country before his invention or discovery thereof, if it had not been before patented or described in any printed publication.

Joint inventors are entitled to a joint patent; neither can claim one separately. Independent inventors of distinct and independent improvements in the same machine can not obtain a joint patent for their separate inventions; nor does the fact that one furnishes the capital and another makes the invention entitle them to make application as joint inventors, but in such case they may become joint patentees. The receipt of letters patent from a foreign government will not prevent the inventor from obtaining a patent in the United States, unless the invention shall have been introduced into public use in the United States more than two years prior to the application. But every patent granted for an invention which has been previously patented by the same inventor in a foreign country will be so limited as to expire at the same time with the foreign patent, or, if there be more than one, at the same time with the one having the shortest unexpired term, but in no case will it be in force more than seventeen years.

Protection to Inventors.

What is a patent? It is a monopoly or grant, in the United States, for a term of seventeen years, to the patentee, his heirs or assigns, of the exclusive right to make, use and vend the discovery throughout the United States, as the inventor's rights may appear in the specifications and patent granted.

This means a great deal to the inventor who has secured a *valid* patent containing all the claims so worded as to prevent infringement and loss in contest. Thousands of inventors, obtaining patents through unreliable and inefficient attorneys or agents, find themselves possessed of patents *in name only*, and of no value when combatted by infringers with capital and the aid of able legal talent. A good patent costs no more than a weak and worthless one. Therefore how shortsighted are those inventors who employ cheap attorneys, saving $5 or $10 in fees, only to find themselves loosers of *all* they have paid when the contest comes.

The Need of Reliable Attorneys.

The Revised Statutes of the United States provide that "before any inventor shall receive a patent for his invention, he shall make application therefor in writing to the Commissioner of Patents, and shall file in the Patent Office a written description * * * of the same in such full, clear, concise and exact terms, as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct and use the same; and in case of a machine, he shall explain the principle thereof and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions."

To carry out these provisions it is necessary for the inventor to first make a clear, concise and complete drawing, or a working model of his invention or discovery, and send it to THE INVENTIVE AGE, or some thoroughly reliable attorney, who, before making application for the patent, should make a thorough and rigid examination of the Patent Office to determine upon its novelty or patentability. If the invention has been anticipated by some one else, or if it lacks novelty, or if for any reason a patent can not be granted, or, if granted, would be of no worth or value, then the inventor does not want to incur the expense of making application and paying attorney's fees and government fees. For making this thorough examination THE INVENTIVE AGE and all reliable attorneys charge $5, which fee is, under some circumstances, however, taken out of the additional fees paid by the inventor in case letters patent are applied for. The fees of patent attorneys vary somewhat, but the average fees for obtaining a United States patent are about $65—the government fees being $15 on filing the application and $20 on issuing a patent—the balance being the fees for preparing specifications, making searches, etc. The inventor is sometimes favored in terms given for payment of the fees, more detailed information regarding which can be obtained by enclosing a 2-cent stamp with enquiry to THE INVENTIVE AGE, Washington, D. C. The reason why the inventor should have a preliminary examination of the Patent Office made before applying for a patent lies in the fact that if the case is rejected the fees paid to the government and the attorney are lost

All patents obtained through us will receive special mention in THE INVENTIVE AGE and in cases of unusual merit inventions will be illustrated free of charge to our clients.

This publication, reaching capitalists, manufacturers and business men throughout the world, is of value in assisting to bring an invention before the public in case its promotion or sale is desired by the patentee.

And What Do You Think of This?

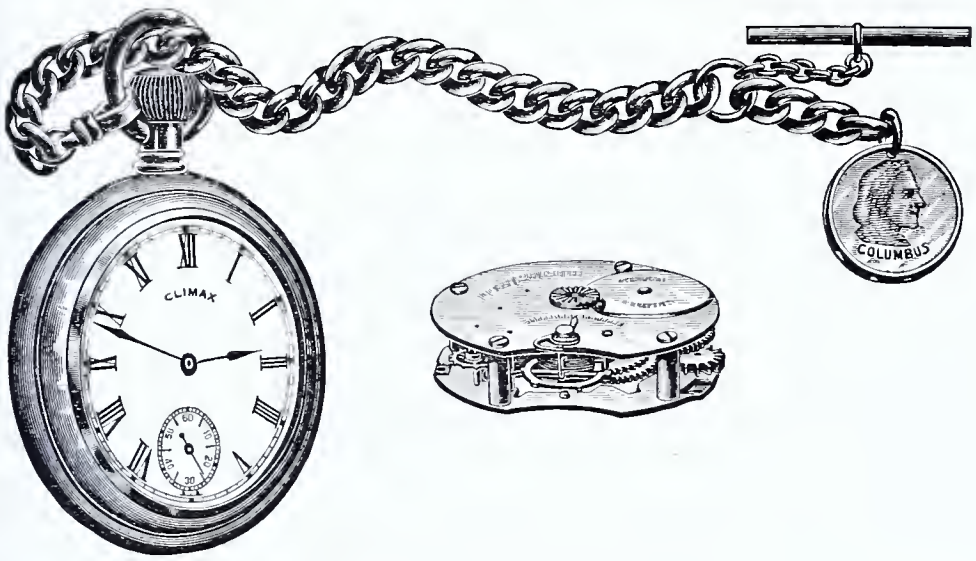
JUST OUT! BRAND NEW! ENTIRELY ORIGINAL!

$2. An American Stem-Winder.

A DUPLICATE IN QUALITY, APPEARANCE SIZE, ETC., OF ANY AMERICAN WATCH SOLD FOR LESS THAN $10.00

Our Watches are Positively and Unequivocally Guaranteed.

THE CLIMAX



EITHER ARABIC OR ROMAN DIAL.

This is the CLIMAX up to date. It represents the most important step taken in Watch evolution in many years. It describes a line beyond which nothing radical will pass for years, not only in the matter of PRICE, but QUALITY. The movement comprises many original patented features, and has been for years the subject of constant labor by one of the foremost of the foremost of expert and inventors.

DESCRIPTION.

CASES.—Two Styles, Plain and Imitation Engraved. Two Finishes, Solid Gilt and Nickel. Two Dials, Roman and Arabic. Snap Back. Heavy Bevel Crystal. Regular Stem Wind. Inside Stem Set. Regular 18 size Case. Chains assorted in each dozen.

MOVEMENT.—Regular American Lever, Lantern Pinion, Quick Train, 240 Beats per Minute Three-quarter Plate, Short Wind, Runs 30 hours to one winding. Dust Cap over Movement.

Fully Timed and Regulated, and FULLY GUARANTEED for one year, the same as Waltham or Elgin.

The Cheapest Stem-Winding Watch Ever Produced.

PRICE $2. With "THE INVENTIVE AGE" one year, $2.50.

JUST PUBLISHED.

How to Build a One-Fourth Horse-Power Motor or Dynamo.

By A. E. WATSON.

Illustrated with full working drawings.

PRICE, PAPER, 25 CTS. CLOTH, 50 CTS.

Address "INVENTIVE AGE," Washington, D. C.

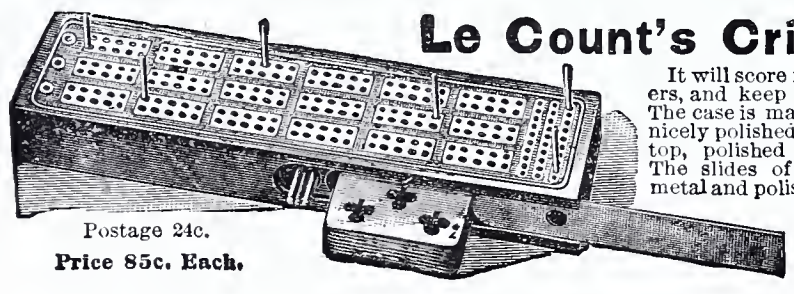
THE STAR FOUNTAIN PEN.

A solid 14 karat gold pen in highly finished hard rubber holder. The only fountain pen that will give perfect satisfaction, sold at less than $2.50. We warrant it in every particular and refund money when it is not satisfactory. A gold pen alone of the same valuo costs in any retail store more than we charge for the whole outfit. Writes 25 pages fools cap to one filling.

By mail, **$1.50** each; **$12** per dozen.

With "Inventive Age" one year, $2.

Le Count's Cribbage.

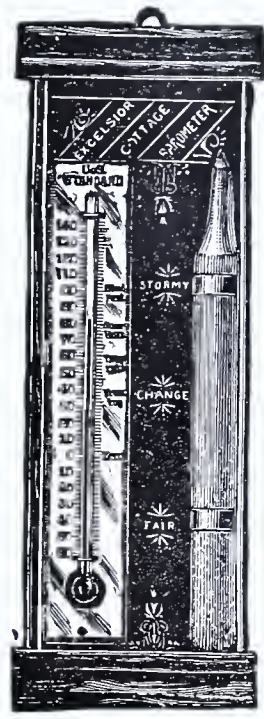


It will score for three or six players, and keep tally of the games. The case is made of black walnut, nicely polished; has a solid metal top, polished and nickel plated. The slides of compartments are metal and polished. This Board is superior to Boards that sell for three times the price. **Full directions with each Board.**

Postage 24c.

Price 85c. Each.

With "Inventive Age" one year, $1.60.



THERMOMETER & BAROMETER

COMBINATION.

Combination Barometer and Thermometer.—Our well known leader. Blue and Gilt back with metal side posts. Fancy top and bottom and handsome enough to decorate the home of a millionaire. Extra well made and dependable on for showing changes in both weather and temperature. One of the biggest bargains in our list. A handsome thermometer, together with a glass tube containing a chemical preparation which rises and falls by action of the atmosphere, foretelling correctly all changes in the weather. This is a new style storm glass aud the most reliable ever known, being in use in all signal service stations. The slightest change in the atmosphere in some way affects this glass. The thermometer is also of the best quality. Both are enclosed in a stand with walnut top and bottom and blue and gilt back. On either side is also a strong metal bar giving the whole great strength and adding to its appearance. Altogether it is a most remarkable combination for the price and we take pleasure in offering it to our patrons

This is not one of the many cheap combinations of which the market is flooded which are neither good for ornament or use and can never be relied upon to forecast either the weather or in fact any thing else.

There is no reason for you to depend on the weather Bureau reports as every person who owns one of our Combinations, can make his or her forecast and tell exactly when it will be fine, rainy and in fact every change in the weather. With this you can tell whether to put on rubbers and a mackintosh or a pair of summer shoes and a costly dress. Don't take any more chances about the weather but be prepared. Each one packed securely in a neat box so that they can be mailed up without any fear of getting broken or damaged. Postage 10c. **Price 32c. Each; $3.00 Doz.**

With "Inventive Age" one year $1.25.

THE DOLLAR TYPEWRITER.

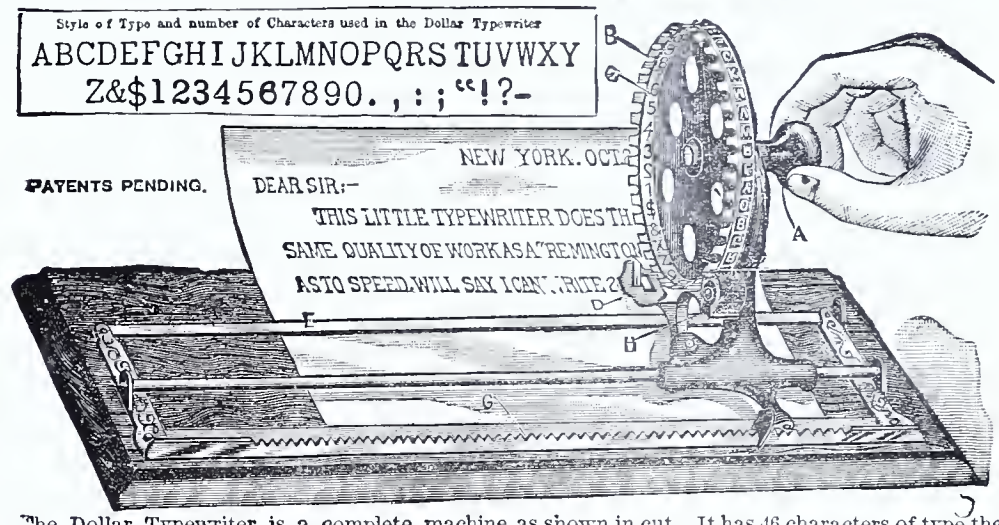
A PERFECT TYPEWRITING MACHINE.

Price only $1.00 by Express; $1.15 by Mail.

Style of Type and number of Characters used in the Dollar Typewriter

ABCDEFGHIJKLMNOPQRSTUVWXY
Z&$1234567890.,:;"!?-

PATENTS PENDING.

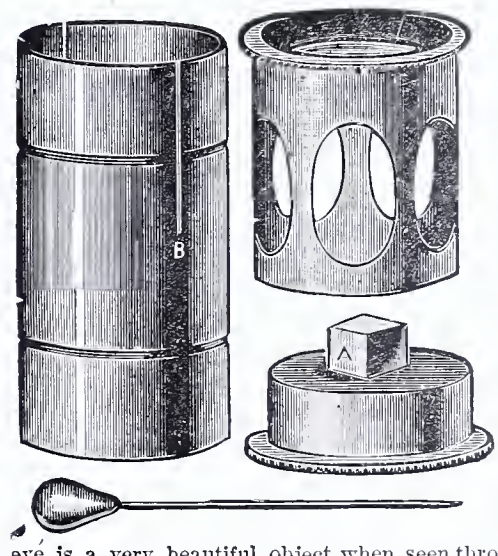


The Dollar Typewriter is a complete machine as shown in cut. It has 46 characters of type the same as that used on a Remington. It is provided with numerous patented devices for inking the type, holding the paper, spacing and governing the impression and allignment. It will write a postal card, note or full letter sheet and is particularly well adapted to addressing envelopes. It is a practical illustration of what a rare combination of ingenuity, skill and capital may do as it embodies many difficult and expensive mechanical movements which were heretofore only possible in high price machines. Over a **QUARTER MILLION** of these machines have been sold within the last year and the secret of its great success is that the manufacturers commenced with a foundation of original ideas and then spared no expense in putting them to practice by the use of the best machinery to be devised. If no more could be said of it this Typewriter is worth many times its cost as an instructor of children teaching and amusing at the same time, but its features of practicability commend it to the use of nearly everyone and the sale it has had and will have is not surprising. It **IS A PERFECTLY CONSTRUCTED** machine that will do work equal in quality to any of the high priced machines. It is so **SIMPLE** that a **CHILD CAN OPERATE IT** and will not get out of order. It is **LIGHT** and **PORTABLE**—just the thing for travelers. It is very **ATTRACTIVE** in appearance, made entirely of metal, mounted on a highly polished hard wood base. It will **WRITE RAPIDLY** with practice—15 to 25 words a minute. We **GUARANTEE** every claim for it, and if not as represented **REFUND MONEY.** The **PRICE** is but **ONE DOLLAR!** This is the age of typewriters, and no one should be without one.

Any typewriting that may be done with any of the high priced machines, from $100.00 down may be done with this one. It is now possible for **EVERYONE** to own a Typewriter and address and write their letters, postals, etc., in the same way the richest firms do theirs. The monopoly in Typewriters died when **"THE DOLLAR"** was born. Postage 15c. **Price $1.00 Each.**

With "Inventive Age" one year, $1.75.

COMBINATION MICROSCOPE.



Scientific skill and the greatest perfection in workmanship coupled with a very high magnifying power, distinguish this handsome microscope over all others ever offered at popular prices. It is specially imported from France, and readily sells for one dollar at retail. As regards power and convenience of handling, good judges pronounce it the best ever introduced for popular use. The cylindrical case is manufactured from highly polished brass, while there are two separate lenses—one at each end of the microscope. The larger glass is a convex magnifier, adopted for examining insects of various kinds, the surface of the skin, the hair, fur or any small articles. It will magnify the hairs on the hands or arms till they resemble large ropes, and it is a most interesting companion. The other lens is exceedingly powerful, and will clearly delineate every small object, entirely invisible to the naked eye such as the animalcules in a drop of water, fishes, feathers and the minutest insects. An interesting illustration of its great power may bo had by placing a drop of sour flour paste upon the bottom of the lens, when on looking through the eye-piece, the sight of the writhing mass of thousands of worms, snakes and eels, is one never to be forgotten. Thousands of living animalcules can be seen in a single drop of stagnant water. An insects eye is a very beautiful object when seen through this microscope. It reveals hundreds of small eyes or six sided facets resembling net work or honeycomb, which enables the insect to see in all directions without moving its head. There are 4,000 of these little eyes in the single eye of a fly. It is invaluable in detecting adulterations in food, such as flour, tea, coffee, sugar, spices, milk and the fatal trichina spiralis or pork worm. Postage 3c. **Price 47c. Each.**

With "Inventive Age" one year, $1.35.

$1,000 REWARD

To every inventor taking out a patent through our office. For particulars and a 70 page excellent hand-book for inventors, inclose stamps and address **The American Patent Market and Novelty Works**, ST. PAUL, MINN

Mention this paper. A. M. CARLSEN, Prop.

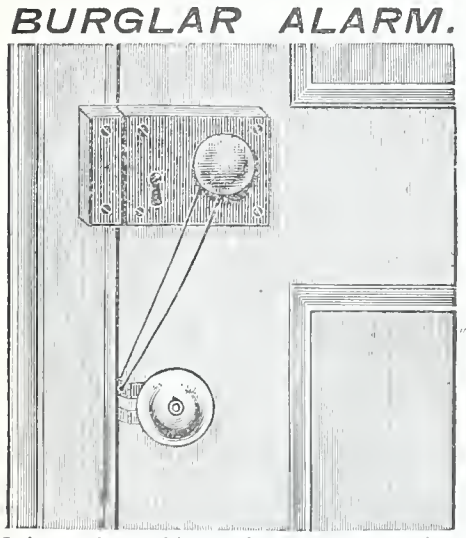
PATENTS.

For eleven years I have devoted my time exclusively to the preparation and prosecution of applications for PATENTS, TRADE-MARKS and COPYRIGHTS, to the management of interferences, to rendering opinions as to scope and validity of patents, to making preliminary searches, and to attending to all matters relating to patents or inventions. Highest references in all parts of the country. Send for hand-book on patents.

RHESA G. DuBOIS,

Inventive Age Building. WASHINGTON, D. C.

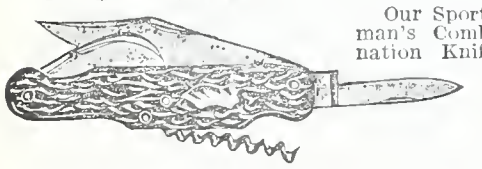
BURGLAR ALARM.



Is it worth anything to know that your door is closed against the smartest sneak thief every night? This Alarm will give you that feeling of security. He may pick or break the lock, but he don't open the door without setting off the Alarm. Its simplicity accounts for its low price and its value. It winds like an Alarm Clock and is closed into any doorjam without injury to woodwork. When the door opens it drops, suspended by string, and goes off with loud ring. Postage 5c. **Price 68c. Each. $7.20 Doz.**

With "Inventive Age" one year, $1.50.

SPORTSMAN'S KNIFE.



Our Sportsman's Combination Knife.

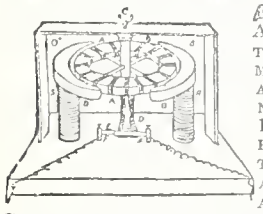
Genuine heavy stag handle with three blades, one large clip blade, one medium, one short and one curved, all in finest crocus polish, also has corkscrew, milled scales, brass lined, German Silver shield, one of the handsomest and most durable knife we have ever offered. Postage 5c, **Price 95c.**

With "Inventive Age" one year, $1.40.

ROSE POLYTECHNIC INSTITUTE,

Terre Haute, Ind. A School of Engineering. Mechanical, Electrical, Civil Engineering, Chemical courses. Well endowed. Extensive Shops and Foundry. Modern equipped Laboratories in all pepartments. Expenses low. Address C. L. MEES, President.

ELECTRO MOTORS; HOW MADE AND HOW USED.



A HANDBOOK FOR AMATEURS AND PRACTICAL MEN BY S. R. BOTTONE AUTHOR OF "THE DYNAMO," "ELECTRICAL INSTRUMENT MAKING FOR AMATEURS," "ELECTRIC BELLS," ETC., ETC. AND A. M. A. BEALE, AUTHOR OF PEALE'S CALISTHENICS, ETC.—A complete and simple explanation of the source of the power in a dynamo and the method of applying the same, commencing with a Simple Motor, and proceeding to an exposition of the Siemen's, Thompson's, Walker's, Grison and other motors.

In addition three special chapters by an American author follow in which the information embraces all American improvements. The work is probably the most complete and easily understood of any of the many now in the field.

180 PAGES, CLOTH, PRICE..... **75 cts.**

With "Inventive Age" one year, $1.50.

Just Published.

Standard Electrical Dictionary,

By Prof. T. O'CONOR SLOANE,

Author of "Arithmetic of Electricity," Electricity Simplified." Electric Toy Making," Etc.

624 Pages. 350 Illustrations. Handsomely Bound in Cloth, 8vo, Extra Super Calendered Paper, **$3.00.**

The large sales of the author's previous works, and the flattering reviews they have received from all sources, together with the great demand for a Dictionary of this kind, have led Prof. Sloane to complete, after a vast amount of labor, a work of a very high standard.

In publishing the "Standard Electrical Dictionary," we have adhered to what the work purports to be, exhausting the subject of electrical terms, giving each title the clearness of explanation necessary to make the understanding of it complete, without unnecessary elaboration. In this work, every electrical word, term, or phrase will be found intelligently defined.

The work is absolutely indispensable to all in any way interested in "Electric Science," from the higher electrical expert to the everyday electrical workman. In fact, it should be in the possession of all who desire to keep abreast with the progress of the greatest science of the times.

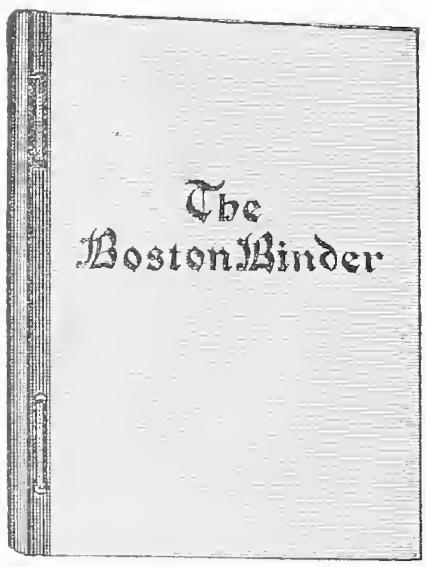
PREPAID TO ANY ADDRESS ON RECEIPT OF $3.00.

Address,

THE INVENTIVE AGE,
Washington, D. C.

Bind "The Inventive Age."

It is the best binder ever invented. It takes only half a minute to insert the paper, and thereafter it is kept clean, and can always be found when wanted. A single binder will hold an entire year's issues of the AGE. When it is complete it can be filed away in your library as a most valuable book of reference for the year 1895.



The Binder is very inexpensive. We send it postpaid on receipt of only **thirty cents**, cash or stamps. It makes all the difference between lost, torn, and dirtied papers, scattered about the house in such confusion that you can never find what you require, and a handsome orderly file which becomes at the end of the year a volume for your library certainly worth from $1 to $3.

To insure a copy of the new Boston Binder to every one of our subscribers, we make the following liberal offer:

FIRST. On receipt of fifteen cents with your renewal to pay for postage, packing, etc., we will send the Boston Binder **free.**

SECOND. To any old subscriber who sends us **one new subscription**, we will send the Binder **free of charge.**

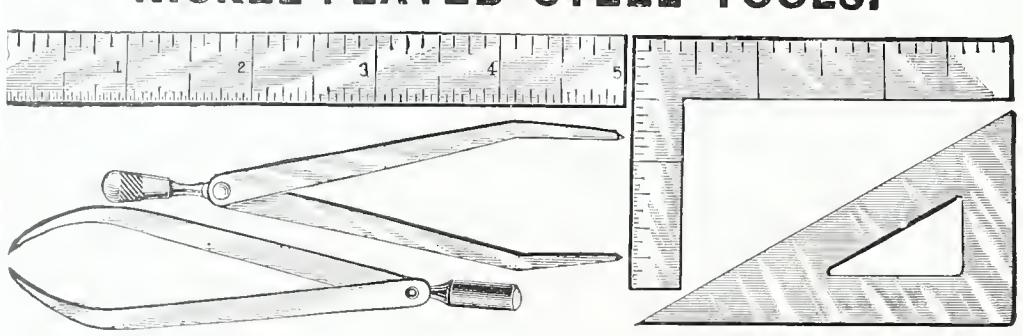
THIRD. Any old subscriber who renews his subscription and sends us **two new subscriptions**, we will send a Binder **free** to each party.

These are very generous offers, but we want every reader of the AGE to preserve his paper, and we are willing to contribute a little ourselves toward this end.

Send your orders in at once for the new Binder.

"INVENTIVE AGE," Washington, D. C.

NICKEL-PLATED STEEL TOOLS.



These articles are made of the finest steel, polished and plated in the best possible manner and are for all practical purposes equal to similar goods sold in stores at five times the price. The well known high prices of such goods, has induced us to manufacture them in large quantities and to furnish them at prices at which every one can afford to buy. They are useful in the household and indispensable in every office and store. In fact no one should be without them.

By mail, **15** cents each; **$1.20** per dozen. Set of 5, **60** cents.

With "Inventive Age" one year, $1.

The Norris Peters Company,

Photo-Lithographers,

458-460 Penn. Avenue, Washington, D. C.

Special attention given to the reproduction and printing of copies on parchment, drawing-paper, tracing-linen, and cardboard, of Patent Office drawings for attorneys to accompany application for patents in foreign countries.

THE AMERICAN PRESS CLIPPING CO.

District Title Building, Washington, D. C.

Please send till further orders, newspaper clippings about myself and on the following subjects:

.....

.....

For which I agree to pay monthly as follows: $1 a month for 25 (or less) clippings; 4 cts. each up to 200 in a month, and 3 cts. each for all over that number, a month.

Name.....

Address.....

C. J. STOCKMAN, Inventive Age B'ld'g, Washington, D. C.

F. E. WELCH. 20 Kimball House, Atlanta, Ga.

STOCKMAN & WELCH,

EXPERTS IN PATENTS,

All work attended to promptly and faithfully

Correspondence Solicited.

Our clients will have the privlege of placing a model of their inveniion on exhibition in our section in the Atlanta Exposition to be held in 1895, without cost to them.

Washington, D. C.

Atlanta, Ga.

PATENTS OBTAINED.

E. W. ANDERSON & CO.,

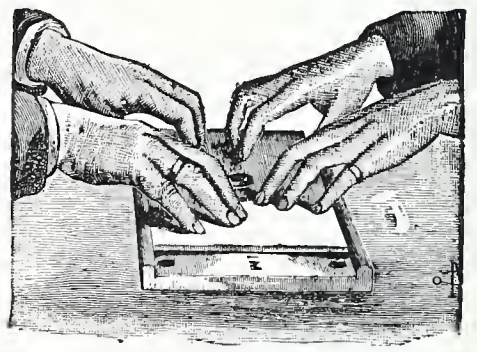
Counsellors at Law,

700 7th Street, WASHINGTON, D. C.

Examinations without charge.

Inventor's Guides free.

GENII OR TALKING BOARD.



This wonderful discovery, based on the mysterious powers of human magnetism, answers all questions on any subject, in the most accurate and marvellous manner. How and why it does this we cannot explain; yet when the Board is set between two persons, and their fingers are placed on the little magnetic table, set upon the Board, the little table will soon commence to move, faster and faster, talking or answering questions rapidly, by touching the printed words or letters on the Board. It works with surprising speed, and will answer every question on all topics—political, religious or social. It will tell your fortune, guide you in business matters, and inform you as to your future husband or wife; tell whether you are to be rich, live long, etc.

The GENII is a marvel, astonishing all who try it. It is a handsomely polished Board, covered with words and letters, and with the magnetic table, is packed in a strong box. Postage 25c.

Price 60c. Each; $6.00 Doz.

With "Inventive Age" one year, $1.75.

SPRING BALANCE SCALES

Spring Balance. An old favorite. Will weigh anything under 24 pounds. The best quality yet produced. Elegantly finished and accurately made and sealed off. Great value! Postage 6c.

Price 12c. Each; $1.28 Doz.

With "Inventive Age" one year, $1.

WM. DUFFY,

REGISTERED

Plumber and Gas Fitter,

1130 N. CAPITOL ST.,

WASHINGTON, D. C.

ESTIMATES FURNISHED

Orders by mail will receive prompt attention.

D. BALLAUF,

Practical Mechanician,

(Established 1855.)

Constructor of Light Machinery, Experimenta and Model Work.

All orders for Certified Duplicates of Patent Office Models, and Models of any Foreign Patents from Drawings and Specifications, filed in the Library of the Patent Office for law suits in case of infringement; also, Original Models for Inventors, and Models to complete application for Patents, from Drawings and Specifications filed in the Patent Office.

731 7th Street, N. W., WASHINGTON, D. C.

The Inventive Age
AND INDUSTRIAL REVIEW.
A JOURNAL OF MANUFACTURING INDUSTRY AND SCIENTIFIC PROGRESS.

Sixth Year. No. 9. | WASHINGTON, D. C., SEPTEMBER, 1895. | Single Copies 10 Cents. $1 Per Year.

The Underground Electric Railway at Washington, D. C.

For twenty years and more, the legislative branch of the United States government has been passing laws prohibiting the use of poles and overhead wires in the streets of this city and the executive department has been trying to enforce these laws. During this time the electric companies have been persistently resisting every such attempt and they have succeeded in defeating the government oftener than they have failed. At this moment the Western Union Telegraph Company, the Chesapeake and Potomac Telephone Company and the Eckington Railroad are all engaged in a fight to maintain poles which have been ordered down, and the chances are that they will gain their point.

The course of the Metropolitan Street Railway in dealing with this question has been a notable exception to the custom. The last Congress passed a law declaring that it should, before the first day of August, 1895, have in operation on its Ninth street line a subway electric system. The president of the company, Mr. Samuel L. Phillips, after a hasty and intelligent survey of the situation, responded "*It shall be done.*" Three days before the time expired he issued an invitation to the District commissioners and other prominent officials, the president of the Board of Trade, the officers and engineers of numerous street railways and others especially interested in the subject, to inspect the plant and go on the first trial trip over the line. Every seat on the train was occupied and the platforms were crowded.

The trip was too monotonously successful to afford anything for interesting description. There was simply a smoothly running electric track without bothersome broomstick attachment. All the machinery was new and untried, the grooved track was very dirty, the conductor bars and contact shoe had all the scale, rust and roughness of new cast-iron, but the train pursued its way over its eight-mile course without interruption or difficulty.

Among the passengers were many men of experience and critical judgment in such matters, and the unanimous opinion was that the practibility of underground electric traction was fully established.

The especial significance of the events lies in the fact that the undertaking was inspired and made possible by the skill, the enterprise and the foresight of the General Electric Company, which, while booming the trolley and building roads by the thousand miles, clearly comprehended the fact that time in which rapid transit in large cities could be maintained to the detriment of all other interests must necessairly be short and did not neglect to prepare for the change now fairly inaugurated, which will relegate overhead wires to the suburbs and country towns. A shrewd and experienced capitalists declared that the running of this Metropolitan train ought to advance the company's stock ten points.

When the train returned to the power station the president promptly issued an order to send out, for regular service, all the trains they could man. Since that day the number has been steadily increasing as fast as men could be trained to run them and by the time this report is in print the last horse car will be withdrawn.

This line embraces all the serious elements of railroading. It has long and heavy grades, many sharp curves and numerous crossings of steam and street roads, while the cars of several other companies run on its tracks for short distances. It intersects some of the busiest and most crowded sections of the city where travel will be irregular and very heavy. It runs along half a mile of river wharves where shiploads of passengers are unloading at all times of the day and night. It passes the Pennsylvania Railroad station, the Center Market and other crowded localities where the capacity of the service will be greatly taxed.

POWER HOUSE, METROPOLITAN STREET RAILWAY.

To meet these demands the company is well prepared. The road, in construction and equipment, is the best in the District of Columbia. There is nothing experimental or temporary about it. Durability and permanency is evident in every detail. Not a dollar has been expended for show, thousands have not been withheld where needed to perfect the plant.

The car barn is a splendid structure with room for 150 cars. The station is equipped with three independent power units—Corliss engines and General Electric generators—each of sufficient capacity to run the entire stock of the Ninth street line, which now comprises about fifteen trains of two cars each. Another generator will operate the eastern half of the main line and the third will meet any emergencies. All the station buildings are lighted by arc and incandescent lamps operated by a special engine and dynamo.

The reconstruction of the main line, for which another year is allowed, has already been commenced—the first line in successful operation and the second in the hands of the builders affords an object lesson which will be studied. Managers of existing and projecting roads, as well as municipal authorities throughout the country, have been watching this enterprise with great interest, prepared to profit by the results, and there is every prospect that numerous other subway roads will shortly be under way.

The Rock Creek railway has an underground trolley system on U street for about a mile which has been successful in operation for two years. This road extends into the country six miles to the District line and is operated by the overhead trolley wire outside the city limits. It is a splendidly managed road, and as a proof of its value, the great Washington & Georgetown Cable Railway Co., of this city, has recently increased its capital from $4,000,000 to $12,000,000 in order to absorb this electric railway and thus secure an outlet through the best part of the suburbs. The consolidation will be known as the Washington Traction Co.

The interest here in electric railways was never greater than at present. The Columbia & Maryland Electric Railway Co. is about to start their construction on the east giving us a rapid transit line of 36 miles between two cities where the population aggregates 700,000, while on the west the Great Falls Electric Railway, 16 miles long, is expected to be operating within a year, opening up the beautiful country to the north along the picturesque Potomac. The electric line to historic Arlington last week ran its first car, and we are told the hum of the trolley will soon be heard across the Long Bridge, giving us quick access to sleepy Alexandria and that Mecca of all patriotic tourists, Mt. Vernon, fourteen miles from Washington.

The capital city is not a commercial center and yet we are up to date in electrical transit and proud of the progress made by our street railway companies in their efforts to provide the latest and best improvements.

(*Continued on page 141.*)

The Inventive Age

Established 1889.

INVENTIVE AGE PUBLISHING CO.,

8th and H Sts., Washington, D. C.

ALEX. S. CAPEHART. MARSHALL H. JEWELL.

The INVENTIVE AGE is sent, postage prepaid, to any address in the United States, Canada or Mexico for $1 a year; to any other country, postage prepaid, $1.50.

Correspondence with inventors, mechanics, manufacturers, scientists and others is invited. The columns of this journal are open for the discussion of such subjects as are of general interest to its readers.

Technical matter is particularly desired. We want practical information from practical men.

Nothing will be published in the editorial columns for pay.

The INVENTIVE AGE is thoroughly independent.

Advertising rates made known on application. Special facilities for furnishing cuts of any patented article together with descriptive article. Business specials 25 cents a line each insertion, 7 words to the line. No advertisement less than 50 cents.

Address all communications to THE INVENTIVE AGE, Washington, D. C.

Entered at the Postoffice in Washington as second-class matter.

WASHINGTON, D. C., SEPTEMBER, 1895.

THE new United States mail pennant for street car service will, it is said, resemble the pennants used on the mail steamships. It will be about two feet long, red, with blue border, with the eagle and inscription "United States Mail" in white letters. It will fly only when the mail is on the car.

THE failure to obtain a four cent rate on the Milwaukee street railway lines has resulted in a renewed attempt to reduce the fare—this time to three cents. Demanding, as the people do, increased facilities, increased luxuries, more safeguards and greater distances, the movement for reducing at this time would seem to be illadvised.

THE July issue of Comfort was something over a million and was printed from the most marvelous of printing presses yet devised and the only one of the kind in the world. It prints a 24-page magazine in five different colors, folding it, stitching it, and deliver the magazines ready for mailing at the rate of 8,000 an hour.

THE appointment of Dr. Daniel C. Gillman, president of John Hopkins University, to the position of Chief of the Department of Awards for the Cotton States and International Exposition at Atlanta, is a guaranty of a high degree of merit as the basis of awords. Dr. Gillman's name in connection with this department will inspire the confidence of all exhibitors.

THE management of the Cotton States Exposition are to be congratulated on the rapidity with which the various buildings have been completed and the remarkable degrse of enthusiasm worked up among the people of the South and East generally. As the time for the opening approaches increases and the exposition promises much in the way of enlightenment on the questions of enterprise and development of the South.

THE Trade Journals' Review is the name of a new magazine just established in Manchester, England. One of the features of the Review will be a review and condensation of the leading articles appearing from week to week and month to month in the various technical magazines of the world. It promises to occupy much the same position among technical journals that Review of Reviews occupies in the literary field.

RECENT experiments in Baltimore with compressed air as a motor power for street cars are pronounced successful and it is not impossible that this power will become no insignificant rival of electricity. Seamless steel flasks sufficient to operate the car from twelve to fifteen miles, according to pressure, can be supplied at the storage station automatically in less than thirty seconds. Interesting developments in this line are expected soon and possibly in time for the Atlanta Exposition.

THIRTY years ago the attempt to run a telegraph line up the western coast of British North America to Alaska and on to Europe by Behring Straits and Siberia was abandoned. It is now reported that the Western Union Telegraph Company is about to take up this great work and push it to completion. In this event the possessions of the United States in Alaska will receive renewed uttention and the development of that whole region, rich in minerals and timber, now so completely isolated from the world, will undoubtedly afford a wonderful good field and rich reward for investment of capital and enterprise.

As a supplement to the Electrical World of July 27th some practical suggestions for resuscitation from apparent death from accidental electric shocks are published. The author is Dr. Austin H. Goelet. The frequency of accidental contact with heavily charged electric wires on the part of operators and especially in connection with electric light and trolley circuits makes the subject of resuscitation one of great importance. In many instances the shock sustained is only snfficient to suspend animation temporarily. To established artificial respiration on much the same principle as in cases of drowning will in many cases result in saving the life of the victim.

AT the meeting of the special committee of the New York Assembly, appointed to investigate railroads there appeared as an expert witness Mr. John Steiner, who had spent twenty-nine years in the service of the Brooklyn and Newtown Company in various capacities. Being asked particularly regarding car fenders he said he was against all fenders, believing the best fender to be a good motorman. It is not likely that Mr. Steiner's arguments had much weight. While it is true that the perfect fender has not yet made its appearance, it is the verdict of those who have gathered statistics on the subject, that the fenders of to-day do save life and limb and in all the larger cities ordinances have been passed compelling their use. To encourage invention in that line some of the larger companies might find it profitable to unite in a large prize offer for the most perfect, automatic fender—one that will stand the most severe tests and operate with the least complexity and occupy the minimum amount of room.

THE consolidation of the vast interests of the Baldwin Locomotive Works and the Westinghouse Electric Manufacturing Company is a straw indicating to what extent the substitution of electricity for steam has proven a success. By the agreement, it is said, the two companies, while working as one, will retain their respective plants as they are at present. Mr. Westinghouse defines it as a "union of interests" for the more economical and improved manufacture of electric locomotives, the demand for which is increasing daily. The Baldwin Locomotive Works were founded by Mathias W. Baldwin in 1831, and they now cover 14 acres of ground, and there are about 5,000 men employed. The capital of the firm, the enterprise never having been incorporated, is placed at $5,000,000. The Westinghouse company has a capital of $10,000,000. In connection with this consolidation comes the story that one of their ambitions is to apply the Tesla motor or improve upon it so that it will be possible to run cars from Pittsburg to New York at the rate 150 miles an hour. Of course to do this will necessitate heavier track and some means of keeping light cars on the track. Whenever the question of high speed is brought up the bicycle system of Colonel Brott, illustrated in these columns a few months ago, commends itself to the favorable attention of engineers and capitalists. The coming session of Congress will be asked to consider favorably a franchise for a single track line from Washington to New York. If the scheme possesses the requisites for commercial success Col. Brott and his associates should receive favorable consideration for the enterprise.

When flying at its highest speed the house fly makes 600 strokes of its wings per second, and the dragon fly 1,500.

Habits of the Beaver.

The beaver is one of the most important rodents. As the body of a full grown male is about two feet seven inches long and weighs about sixty pounds, there are few rodents that surpass him in size; in Europe he has no equal among the rodents. The broad head, somewhat narrowed toward the front, on a short, thick neck, and the stout body, which is wider at the rear, give the animal a clumsy look. The webbed hind feet indicate its amphibious nature, and his tail is of such a peculiar shape that any child would recognize him by it. It is flattened, so that when one looks down upon it, it seems to be egg-shaped, and it is covered with little angular scales. The color of the tail is dark gray, while the thick fur on the animal's back is chestnut brown and that under the body is lighter. The beaver's chief tools are his very large chisel-shaped teeth, which are very long and prominent. His nose and ears are well adapted for his aquatic life, for the little short ears that are nearly hidden in the fur can be laid so flat on his head as to effectively exclude all water, and in a similar manner the nostrils are closed by thick flaps. For years past busy fancy has added many fables and fairy stories to the accounts of the beaver's life and habits, but these are sufficiently interesting without such additions; especially where he can enjoy undisturbed security.

We must go to lonely parts of Asia or North America, particularly to Canada—the latter has the beaver in its coat of arms—to find large colonies or societies of beavers, for they settle on rivers and streams that run through forests in which the sound of the axe has never been heard, building in their characteristic fashion. Their dome-shaped houses or "lodges," which are sometimes nine feet high, serve as temporary dwellings to be used in case the underground dwellings are flooded. The latter are entered by long tunnels that open in deep water. The neighboring wood furnishes the materials for the "lodges;" even thick trees fall victims of the sharp teeth of the beaver, and are skillfully cut up. The branches and twigs, the bark of which forms his food, are all used for building, being placed one upon the other without regularity; but the beaver, a natural marine architect, saves the thicker stems for a different purpose. If the level of the water in the stream on which he has settled is subject to marked variations, he builds a dam reaching from one bank to the other, these dams often being 650 feet long and several yards thick at the base. The thick logs are driven into the ground and bound together by thinner branches, and then the whole is covered with earth, mud and water plants, forming a scientifically built dam. When a large colony has settled in a safe place in the wilderness, regular cities grow up, and the appearance of the landscape is entirely changed by the thinning of the woods and the formation of extensive ponds by the dams, for generation after generation works on, increasing the size of the settlement until the beaver cities in the lonely wood can compete for age with the cities of men.

Electric Ploughing in Germany.

Practical experiments in electrie ploughing, says the London *Electrical Engineer*, have been made at Halle-on-the-Saale, Germany. Here a two furrow tilting plough was used. The electric motor is fixed to the implement itself. The shaft fitted with a pinion, over which a chain runs from one end of the field to the other. This chain is held taut at both ends by triple ground anchors. When the motor is put in operation it will haul the plough across the field. When the end of the field is reach the plough is tilted to the other side, and by reversing the motor the plough starts on its return journey, at the same time depositing the chain sideways for the next row of furrows. The achors are movee by a laborer, who lifts them out of the ground with a hand lever. The current is generated by a portable dynamo and 10-hp steam engine, and the current is conveyed by a cable that follows the car upon light cars, which turn readily in any direction. The power used in the heavy loamy clay at Halle-on-the-Saale was an average of eight kilowatts. The plough turned two furrows, measuring together 60 cm in width by 24 cm in depth, and, traveling at 0.9 metre per second; the actual useful effect was equal to eight effective horse-power, which showed that there was a loss of about 4 hp between the portable engine and the plough. A 16-hp engine was used for a four-furrow plough, and depth of the furrow was 24 cm. One of the remarkable features of this system is that, guided by the tightened chain, very shallow furrows can be made with great evenness and regularity, and the balance plough can thus be used for turning over stubble land and other light work. As regards attendance, only one man is needed for the lighter plough, while for the larger one three men are required—a ploughman and a man at each end to shift the anchors. The first cost of an electric plough is said to be much below that of a steam cultivating plant.

SCIENCE FOR YOUNG PEOPLE.

Conducted by E. P. Lewis.

By the use of liquefied air Professor Dewar, of the Royal Institute of Great Britain, has been enabled to carry on some very interesting experiments on the behavior of substances at very low temperatures. The air is liquefied by the combined application of great cold and pressure, and on again evaporating it will produce a still greater degree of cold. This is due to the fact that it requires a certain amount of heat, called latent heat, to separate the molecules of a liquid and thereby produce a gas or vapor. In case there is no other source of heat available, the heat required to evaporate the liquid air must be taken from the surrounding bodies. In this way these bodies may be brought to a temperature estimated to be about 180 degrees centigrade below the freezing point of water.

One striking effect of subjecting metals to intense cold was found by Dewar to be a great increase in their elasticity and strength. For example, a spiral spring of metal wire was stretched straight by the weight of one ounce at the ordinary temperature. When cooled by sponging it with liquid air, it supported a weight of two pounds without losing its spiral form and vibrating through quite a considerable range, showing great elasticity. It was also found that it required about twice the ordinary force to break an iron bar at this low temperature.

Another interesting effect was the condensation of mercury vapor. An ordinary barometer consists of a glass tube about three feet long closed at one end and containing a column of mercury balanced against the pressure of the atmosphere. It is prepared by entirely filling the tube with mercury, which is boiled to expel any air or other gas which it may have absorbed. On closing the open end of the tube with the fingers and inverting it in a vessel containing mercury, the column of mercury in the tube will rapidly drop until its height above that in the basin is about 30 inches. A column of this height is balanced by the atmospheric pressure, and variations in the height of the column indicate variations in the pressure of the air. We ordinarily call the space above the mercury in the tube a vacuum, but in reality it contains a small quantity of mercury vapor. On sponging the end of the tube with liquid air, the intense cold will condense this vapor and cause a thin film of mercury "frost" to be deposited on the glass, forming a mirror-like surface.

Still another effect observed by Dewar was that of cold on magnetisation. If a magnet is heated it loses in strength, and it might be naturally supposed that the reverse would be found true on cooling. This Dewar found to be the case. Small magnets made of watch springs would gain 30 or 40 per cent in strength on being sponged with liquid air, but come back to their original strength on returning to the ordinary temperature.

* * *

Faraday suspected that all bodies might be found to exhibit magnetic properties if subjected to great cold. He failed to prove this, but it is a fact that practically all bodies are more or less magnetic at ordinary temperatures. In most cases the effect is so small that it requires great care and skill to detect it. Nearly all the metals are either magnetic or diamagnetic—that is, a needle made of them will stand either in the direction of the magnetic force or at right angles to it. Crystals always take up a definite position in the magnetic field. Tyndall also found that wood, bones and other substances having a regular structure differing in different directions, like the grain of wood, will lie in different directions when subject to magnetic forces.

* * *

It is an easy matter, without in any way injuring its appearance, to make cloth almost fire proof. This may be done by mixing a little alum or tungstate of soda with the starch used on the cloth. When treated in this way the cloth will not blaze up when exposed to a flame, though it will char very slowly.

* * *

There has recently been a good deal of discussion over what was called "a new natural force," although it turns out to be an old and well-understood principle of mechanics. If a funnel-shaped nozzle be fitted to a hose pipe and a little sphere of some material be placed in this nozzle, it will be found that a stream of water flowing through the pipe with considerable force will not drive the ball from the nozzle, as might be expected, but will seem to suck it toward the narrow end of the funnel, in apparent opposition to the pressure of the water.

This is by no means a new discovery. An illustration of the same principle which has been known is given by holding the first and second fingers slightly apart, placing a small piece of paper behind them, and blowing through the fingers against the paper. The latter, instead of being blown away, clings to the fingers as long as the blowing continues, but drops of its own weight when the blowing ceases.

Likewise if a card be fitted with a hole in its center over a tube and another card held over it, on blowing through the tube the upper card will be drawn down.

The explanation, while not so simple as to be seen at a glance, is in accordance with ordinary and well-understood mechanical laws. From there it may easily be proved that in a fluid, such as air or water, the pressure is always least where the velocity of the fluid is the greatest. Hence in the case above mentioned, since the air between the cards is driven out with great velocity, the pressure there is less than in the still air above the card, which is in consequences forced downward. The same reasoning applies to the case of the ball and the funnel. Another way of looking at it is to consider that the rapidly moving air sets up eddy currents and whirlpools which suck out the still air between the cards, creating a practical vacuum, so that the cards are forced together by the pressure of the external air.

From the Cradle to the Grave.

Possibly there are a few readers of the Inventive Age who have not read the following beautiful description of "Life" by Robert G. Ingersoll, and many who have read it will be pleased to read it again:

Born of love and hope, of ecstacy and pain, of agony and fear, of tears and joy—dowered with the wealth of two united hearts—held in happy arms, with lips upon life's drifted font, blue-veined and fair, where perfect peace finds perfect form—rocked by willing feet and wooed to shadowy shores of sleep by siren mother singing soft and low—looking with wonder's wide and startled eyes at common things of life and day—taught by want and wish and contact with the things that touch the dimpled flesh of babes—lured by light and flame and charmed by color's wondrous robes—learning the use of hands and feet, and by the love of mimicry beguiled to utter speech—releasing prisoned thoughts from crabbed and curious marks on soiled and tattered leaves—puzzling the brain with crooked numbers and their changing, tangled worth—and so through years of alternating day and night, until the captive grows familiar with the chains and walls and limitations of a life.

And time runs on in sun and shade, until the one of all the world is wooed and won, and all the lore of love is taught and learned again. Again a home is built with the fair chamber wherein faint dreams, like cool and shadowy vales, divide the billowed hours of love. Again the miracle of birth—the pain and joy, the kiss of welcome and the cradle-song drowning the drowsy prattle of a babe. And then the sense of obligation and of wrong—pity for those who toil and weep—tears for the imprisoned and despised—love for the generous dead, and in the heart the rapture of a high resolve. And then ambition, with its lust of pelf and place and power, longing to put upon its breast distinction's worthless badge. Then keener thoughts of men, and eyes that see behind the smiling mask of craft—flattered no more by the obsequious cringe of gain and greed—knowing the uselessness of hoarded gold—of honor bought from those who charge the usury of self-respect—of power that only bends a coward's knees and forces from the lips of fear the lies of praise. Knowing at last the unstudied gesture of esteem, the reverent eyes made rich with honest thought, and holding high above all other things—high as hope's great throbbing star above the darkness of the dead—the love of wife and child and friend. Then locks of gray, and growing love of other days and half remembered things—then holding withered hands of those who first held his, while over dim and loving eyes death softly presses down the lids of rest. And so, locking in marriage vows his children's hands and crossing others on the breasts of peace, with daughter's babes upon his knees, the white hair mingling with the gold, he journeys on from day to day to that horizon where the dusk is waiting for the night. At last, sitting by the holy hearth of home as evening's embers change from red to gray, he falls asleep within the arms of her he worshiped and adored, feeling upon his pallid lips love's last and holiest kiss.

A Detroit dispatch says that for a consideration of $415,000 the Mergenthaler Linotype Company has secured all the rights, title, and interest in the patents on the machines of the Rogers Typographic Company, thus ending the long pending litigation.

The Church Census.

The census report, covering the statistics of churches which has recently been issued, contains some interesting facts. It is an elaborate work of more than 800 pages, with colored maps showing the extent of the various organized religious bodies in the various states.

These are 143 distinct denominations in the United States, besides independent churches and miscellaneous congregations. The total communicants of all denominations is 20,612,806, who belong to 165,177 organizations or congregations.

These congregations have 142,521 edifices, which have sittings for 43,564,863 persons.

The value of all church property, used exclusively for purposes of worship, is $679,630,139. There are 111,036 regular ministers, not including lay preachers.

There are five bodies which have more than 1,000,000 communicants, and ten more than 500,000. The leading denominations have communicants in round numbers as follows: Roman Catholic, 6,250,000; Methodist, 4,600,000; Baptist, 3,725000; Presbyterian, 1,280,332; Lutheran, 1,230,000; Protestant Episcopal, 540,000.

The Atlanta Exposition.

A correspondence writes to the Manufacturers' Record from Atlanta as follows:

The New York commission that came to Atlanta to pick the ground for and start the New York building at the exposition decided that this would surpass any exposition ever held in the United States except the Chicago fair. The exhibits are beginning to come in. The seventeen great public buildings are nearly finished. The buildings of New York, Massachusetts, Illinois, Pennsylvania, Arkansas, Alabama and other great States are in process of construction. All the leading countries of Europe will send individual exhibits. Mexico, the Argentine Republic, Chili, Paraguay, Venezuela, Hunduras, Salvador, Costa Rica, etc., will send government exhibits, while Mexico has loaned her magnificent military band, of international fame, to the exposition, and will have a Mexican village covering three acres. A host of other national villages from all parts of the world will be located there also.

The Midway Plaisance or Heights will have everything of interest that was at Chicago, and a number of new novelties. In many respects the Chicago Fair has been improved upon. The United States government exhibit, in its handsome building, will be something extraordinary. The woman's building will be a marvel of interest and novelty, and the intercolonial display of relics will be magnificently historic. Every leading interest, city and State, and every business organization will have special days, and thus give a wide variety of interest to the exposition. As a very large attendance is expected, hotels are multiplying in number.

Thanks to the exposition and other features, Atlanta is entering upon a career of prosperity and power that cannot be estimated.

A Balloon Electric Sign.

The crowds which throng the vicinity of Herald Square, New York City, at night may be seen with their eyes elevated heavenward gazing at a single word of living fire which oscillates slowly to and fro high above the house tops and apparently floats unsupported in the air. The word is "Sapolio" and the sign is a transparency filled with incandescent electric lights supplied with current through cables from a source on the ground. The sign is hung from a capative balloon and the lighting cables are carried up the rope which anchors the balloon. On a dark night the balloon is practically invisible and the weird effect produced on the observer by seeing the sign apparently unsupported causes comment which attains the desired result—advertising.

Canned fruit and vegetables should be opened an hour or two before being used. In this way they become richer, as the oxygen of the air driven off at the time of sealing is restored to them.

A patent was recently issued to Herbert Cottrell, of Newark, N. J., for a new telephone operated without electrodes. It operates on the principle of an electrical shunt, having a path of higher resistance, whereby necessary variations of the current may be produced.

Edward L. Norfolk died in Kingston, N. H., July 12, in his 80th year. He was noted for his many achievements as an engineer, architect and contractor. It is claimed that he was the inventor of the first shoe pegging machine, and also that he ran the first engine on the Eastern railroad. He was one of the builders of one of Newburyport's large factories, and during the Civil War he built several monitors for the government.

Aluminum Becoming in the Arts the Metal of the World.

Up to about the years 1886-9 the cost of aluminum for use in the varied arts was so enormous, compared with the present low price per pound, that very limited and special uses were made of it, but now, when the price per pound has been reduced from six or eight dollars per pound to about fifty cents per pound, it, as a metal, is becoming a very common article of use in the extensive manufacture of numerous articles, such as toilet furnishings, clippers for hair of man and horse; stringed musical instruments, bicycles, ariel cars, or flying machines; marine structures, paper cutters, business cards, etc., etc. This sudden revolution in the price and use of aluminum metal is due to inventive genius, inspired and encouraged by our excellent system of patent laws; for by recent patents during the past few years for inventions relating to electrolysis, and the reduction of aluminum by electrolysis in combination with certain chemical compounds, the grand result has been brought about. By these inventions, aluminum, found almost universally in the earth on which man treads, can be so cheaply and expeditiously separated from the foreign elements to which it so tenaciously adheres, that there is no longer any question about the success of mechanical plants erected for its reduction for sale as a metal for use in the construction of hundreds of useful articles for the comfort and happiness of the human race.

The first isolation of aluminum from the elements to which it adheres, is attributed to one Woller in 1827. There is great difficulty in obtaining the pure metal from its compounds, because of the peculiar tenacity with which it unites with other substances. The compounds of aluminum are very abundant in nature. The most common, perhaps, is the oxide of aluminum called alumina, one molecule of which is composed of three atoms of oxygen and two atoms of aluminum. Alumina is insoluble in water and practically infusible. Fluorine unites with the metals to form fluorides. The fluoride of sodium and the fluoride of aluminum united, form what is known as the double fluoride of aluminum and sodium. There are several minerals found in nature which are double fluorides of aluminum and sodium, of which cryolite is much more common than the others, and is found in Greenland. Its uses are so extensive that it has become a well-known article of commerce. More than fifty metals are known to chemists, and when one of these is united with a non-metallic substance, and the compound is reduced to a liquid state by solution or fusion and subjected to an elcetric current, which decomposes it, the non-metallic elcment of the compound will be drawn by the current to that point in the bath where the current enters it from the positive pole, called the "anode," and the metal will move in the direction of the point where the current leaves the bath for the negative pole, called the "cathode." Metals differ, however, in the ease with which the current can draw them to the cathode; and when one is more sluggish than another in yielding to this influence, the one is said to be more electro-positive than the other. Scientists have arranged all known metals accordingly. The only metals more electro-positive than aluminum are magnesium, calcium, strontium, barium, lithium, sodium, potassium, rubidium and caesium. All other metals yield more readily to the current. When several compounds in solution or fusion are electrolyzed the current will attack and decompose that compound whose parts are least firmly united, or, as the phrase is, least stable." As might be supposed from the foregoing, the more electro-positive a metal is, the more stable its compounds are likely to be. Alumina is so common in nature that every one, in a desire to get pure aluminum, would naturally turn to that as one of the simplest of its compounds; but the fact that the oxygen has proved to be so firmly united to aluminum as to resist the action of the highest heat has been very discouraging to chemists.

From Woller we turn to a book on aluminum published by one De Ville in 1859, and find described a process of coating copper with aluminum. De Ville employed electrolysis, or the process of decomposing a chemical compound by the passing of an electric current through it. His bath was a double chloride of aluminum and sodium, the cathode a bar of copper, and the anode a bar of aluminum. When the current passed through the bath the chloride of aluminum was decomposed, and the aluminum was deposited on the copper, and the chlorine gas, freed at the anode, attacked the bar of aluminum and formed the chloride again, thus keeping the bath constant. De Ville also described a modification of this process, in which the bath was cryolite—a double fluoride of aluminum and sodium—and the anode a mixture of carbon and alumina, which, upon the passage of the current, gives the following reactions: The fluoride of aluminum is decomposed, its aluminum precipitated at the cathode, and the fluorine at the anode, where it combines with the aluminum of the alumina to form again the fluoride, and set free its oxygen, which combines with the carbon to form carbonic oxide. These processes of De Ville, it is contended, did not result in the electrolyte being dissolved alumina, but the fluoride of aluminum—one component of the bath itself; and the bath did not remain constant but required continuous renewal by the electro-chemical solution of the alumina of the anode; and even though the alumina from the anode in the DeVille process was dissolved in the bath and electrolyzed, no note of the fact was made by De Ville, and therefore it must be treated as an accident which he failed to observe, and consequently of no benefit to the world, or to those who came after him. It is also contended that the De Ville process failed to accomplish a complete regeneration of the bath—free from the escape of the corrosive fluorine gas, and therefor his process was a failure for commercial purposes, etc.

A French patent was granted to one Fuerst in 1884 for an electrolytic process of producing aluminum from alkaline aluminates in solution or fusion, alumina being added to regenerate the bath. The process described by him seems to have been inoperative; he, however, mentioned as one of the "indifferent or auxiliary bodies" that might be present in his hypothetical electrolyte, hydrofluoric acid; and it has subsequently been found by experiments that if there be added to aluminate of soda eight times its weight of hyrofluoric acid, there would result a double fluoride of aluminum and sodium, which, upon the addition of alumina and the passage of the current, would give the results of processes invented subsequently to this patent. But it has been successfully contended in the courts that this experiment cannot be carried back to show an anticipation by Fuerst of the modern inventions which have brought about the successful reduction of aluminm, for the reason that he mentioned hydrofluoric acid as only an "indifferent or auxiliary body," and never proposed its use in excess; and moreover because the experiments violates his express injunction that these foreign bodies, whatever they may be, shall not produce decomposition of the aluminates employed.

Among the men of genius engaged in this class of invention is a young man, Chas. M. Hall, formerly of Oberlin, Ohio. Between the years 1884 and 1887, while a student at the Oberlin University, Hall began to devote his attention to electrical inventory and the discovery of a process for reducing aluminum by electrolysis. It is related by one closely connected with him, that during his collegiate course, he would suddenly stop his studies of the year's course and work in the laboratory, assiduously pursuing the subjects then exercising his mind and setting his brain on fire; and at the end of two or three months would go back to his tasks and come up with the other students fully prepared for the examinations of the year At last he arrived at the solution of the problem, "How can aluminum be reduced so that it may be sold at about fifty cents per pound or less?" His process, as finally settled upon, consisted of a bath made up of compounds more electrocally "stable" than aluminum and which would freely dissolve aluminum, and thus when the electric current was applied to the mixture it would precipitate the aluminum upon the cathode, and would free the oxygen at the anode. He discovered that the fluoride of aluminum when united with the fluoride of any metal more electro-positive than aluminum to form a double fluoride, would, when heated to fusion, dissolve aluminum as freely as sugar would dissolve in water, and that an electric current passed through the fused mixture would deposit pure aluminum at the poles. Hall took out four patents for his inventions; numbered, respectively, 400,664, 400,665, 400,666, 400,667. In one of these he claimed the general process broadly as follows:

1. As an improvement in the art of manufacturing aluminium, the herein described process, which consists in dissolving alumina in a fused bath composed of the fluorides of aluminum and a metal more electro.positive than aluminum, and then passing an electric current through the fused mass.

2. As an improvement in the art of manufacturing aluminum, the herein described process which consists in dissolving alumina in a fused bath composed of the fluorides of aluminum and sodium, and then passing electric currents by means of a carbonaceous anode through the fused mass.

As one of the mechanical appliances for carrying out this invention, Hall suggested a crucible of iron or steel, lined with carbon and placed in a furnace; the double fluoride was to be placed in the crucible and subjected to heat until the fluoride was fused; the poles of an electric dynamo were to be connected with the bath, the negative pole connecting with the carbon lining and making that the cathode, while the positive pole was connected with a piece of carbon suspended over and extending into the fused mass, and alumina was to be added to the bath when fused, and an electric current of from four to six voits was to deposit the alumina on the bottom of the crucible; when a sufficient quantity had been deposited the melted aluminum was to be removed from the bath by suitable means, or the bath poured out and the aluminum then taken out. In operating on a large scale it was found that the resistance of the bath to the electric current necessary to decompose the alumina would produce heat enough to keep the bath in proper fusion, and so the furnace could be dispensed with.

Hall's process was a new discovery, a decided step forward in the art of making aluminum, and to his invention is due the credit of the reduction in price of aluminum from six to eight dollars per pound to about fifty cents per pound or less.

Surely this was a revolution, and it has had the effect of extending the uses of aluminum in many directions not possible on account of its previous great cost. So important has the invention of Hall been regarded, that, while it must be admitted that the many new inventions in the line of producing electric currents of great volume and intensity have contributed to render the Hall process an economical one, it is believed, and it was so stated by the learned Judges Taft and Ricks of the Circuit Court, N. D. of Ohio, in passing favorably upon Hall's patents, that the manufacture of pure aluminum must have continued to be a purely chemical one, had not Hall made his discovery.

In passing, it is proper to remark, that, while Hall was young, in moderate circumstances, and struggling for want of sufficient means to demonstrate his invention on as large a scale as required, he industriously experimented on a limited scale, and by these experiments convinced some of his friends of its practicability and value, and the sum of $20,000 was furnished to be invested in a plant to produce the aluminum commercially.

At the present date the invention is being largely practiced by the Pittsburg Reduction Company in the manufacture of aluminum, and doubtless the inventor who has established his fame as a new discoverer and a chemist of high order, is in the sure road to a moneyed reward for his genius, industry and perseverance. The said company have just started a large new electrical reducing plant at Niagara Falls, using the new electric power generated by the Niagara River.

It certainly is creditable for a young man about twenty years of age, and while pursuing his studies as a student at the Oberlin University, Ohio, to have brought to perfection this important and valuable discovery.

Recently several patents have been taken out for special applications of aluminum in the arts; among these are those of Mr. Neil Merrill, president of the Musical Instrument Co., of Pittsburg, for the use in a novel manner of this metal in the manufacture of stringed musical instruments, such as mandolins, banjos, guitars and the like. This metal is preferred in such instruments because it is found to give a very sweet sound, while it makes the instrument very light and durable, and can be very readily manipulated in the formation of the instruments, and especially is this the case when it is combined with other metals. The use of aluminum in the construction of bicycles is resorted to because it is very durable and of great utility on account of lightness. In the manufacture of barber's hair clippers, the American Shearer Manufacturing Company, of Nashua, N. H., have adopted the use of this metal, on account of its great lightness; furthermore the celebrated Professor Langley of the Smithsonian Institution, has benefically employed it in making a flying machine of great lightness and resisting capacity, and with it achieved a flight of 1000 feet; while others have successfully used it in the construction of boats. No one can tell where its use will end. The great question remaining to be solved now, is, who can make a discovery of cheaper methods by which the reduction of aluminum by electrolysis or other means can be effected at a cost as low as ten to fifteen cents per pound. Let some other studious genius like Charles M. Hall, if Hall does not do it himself, enter the field and if possible prove himself a greater benefactor of his race than even Hall. In conclusion it is remarked that experience has proved that it is not safe to say of the last patented invention, no matter how great and revolutionizing it may prove, that it is the "ne plus ultra," for there is likely to be something beyond.

ROBT. W. FENWICK.

Washington, D. C., September, 1895.

Nearly all car springs are now made from crucible steel. Spring steel contains a heavy percentage of carbon—about 95 per cent—while ordinary boiler steel contains less than 3 per cent. All springs before leaving the factory are tested by putting enough weight on them to bring them down solid with the coils or leaves touching one another. Springs must stand this test without a fracture, and when the weight is removed must return to their original shape without showing any permanent set.

The Kodak Inside the Great Pyramid.

There have been many discussions about the object and hidden meaning of the Great Pyramid, but it now seems clear that it was erect, as were all the other pyramids in Egypt, as a tomb only, and that for one man. As obelisks, typical of life, are only found on the east side of the Nile, so the pyramids, memorials of death, are found only on the western side, entirely surrounded by countless graves, on the borders of the great desert and the cultivated valley.

The Great Pyramid was built, so we are told, about 3700 B. C., by King Khufu (in Greek, Cheops), and is the largest and perhaps the oldest of all. It is of vast size, being originally 480 feet high, with a base that would fill up Lincoln's Inn Field, each side being about 760 feet long. Part of the top has been broken off, and also the smooth outer casing, leaving it in its present rough and step-like condition.

In the heart of this mass a small chamber was cleverly constructed, a quadruple roof of enormous granite stones preserved it from being crushed by the great weight above. A passage led to the exterior, and after the king's death he was mummied, placed in a coffin inside the sarcophagus, and dragged up into the chamber, the mouth of the passage being subsequently blocked up and concealed, so that the body should not be disturbed. The entrance was, however, broken open centuries ago, and the body destroyed long before modern times.

After stooping and climbing along for a great distance, each person helped by two Arabs, we found ourselves in the King's Chamber, one day in February, 1894.

I had taken a quantity of magnesium wire inside, and, as we were burning this, it suddenly occured to me to try and take a photograph with my kodak. I had only brought it with me to save it from being used as a football by the Arabs if I left it outside. There was no support and the heat in the tomb was intense, but I managed to lean, and at the same time hold the camera, against one of the walls, while an Arab burnt about one and a half feet of wire. The result fortunately is good enough to show the sarcophagus in the position it has occupied throughout all history for nearly 6,000 years. The lid and one corner are broken. It is possible to distinguish the place where the Arab lit the wire, and, at the end, dropped it, besides the names of several English tourists on the walls. It is also just possible to see one of the joints between the stones of the wall behind the sarcophagus, but it does not show very clearly, for even now, though no mortar was used, it is not possible to insert the finest blade between the stones, so perfect was the construction of this mighty tomb.—R. MacInnes, in the Kodak News.

A Valuable Invention.

A lamp that will burn for six hundred hours is the invention of George L. Roberts, an electrician, who sold to a tobacco house, for $80,000, the advertising rights of some of his electrical devices. The lamp of which Mr. Roberts is the inventor is charged with sand, into which two wires are run, which connect with one of the regulation bulbs used on all electric chandeliers. The battery is therefore the sand, but the method of charging it remains a secret with Mr. Roberts. Mr. Edison, after seeing Mr. Roberts' lamp, remarked that he thought he knew all there was to know about electricity, but Mr. Roberts had made a discovery which puzzled him greatly. Mr. Roberts presented Mr. Edison with some of this remarkable sand, but with no fear of having his secret discovered, for analysis happens in this case to kill all traces of the secret discovery. The cost of recharging each lamp is seventeen cents.

Mr. Roberts made his discovery in Minneapolis in a purely accidental way. He was experimenting with acids in his laboratory and on the table was some sand, over which two wires had fallen and crossed themselves. By an accident a bottle containing a certain acid was overturned and some of the acid ran into the sand at the point where the wires crossed. The result was a series of electric sparks. Another of his inventions is to make seventy-two changes of color, in the hair, dress, tights, shoes and so forth, of a dancer while she is in motion. The mechanism works by clockwork and the light gleams through the fabrics from a direct current.

Recent Australian Patents to Americans.

The following list of applications has been especially prepared for THE INVENTIVE AGE by Mr. George G. Turri, certified patent agent, Melbourne, Australia.

O. Ohlson, Newark, N. J., Centrifugal creamers.

Diamond Match Co., Chicago, Ill., Machines for making wax matches.

L. F. Betts, Brooklyn, N. Y., Lamps.

E. D. Kindall, Sewaren, N. J., Recovery of gold and silver from solutions.

The Underground Electric Railway at Washington, D. C.

(*Continued from page 137.*)

The suburban roads, generally built or projected to favor land investmests, are seeking entrance to the heart of the city over the new routes, whether the new route in the city is needed by the public or not. It is not the business of railroad companies to enhance or even preserve the quiet freedom from obstruction and beauty of the streets of Washington: they are looking for traffic alone, without regard for the general public interest.

An established surface motor would tend to displace the present overhead trolleys, which are not satisfactory on city or suburban streets. The motor would offer an alternative requiring no change of of roadbed or tracks.

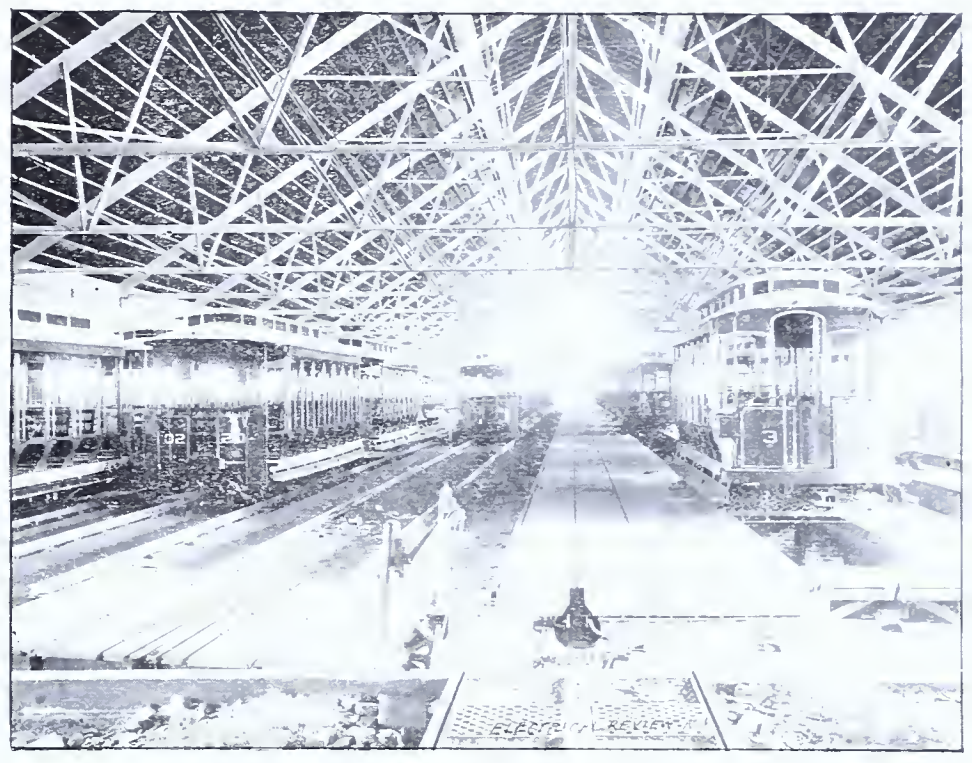
In short, the advantage of surface motors of compressed air, gas, vapor or other kinds, which are noisless and smokless, are very considerable, and their use should not only be allowed, but encouraged.

One of the Commissioners is of the opinion that, if overhead trolleys and conduits were positively prohibited, a satisfactory surface motor would be promptly produced. In fact one kind of surface motor seems to be available, or, to say the least, is very promising.

According to a late report of the United States Consul General at Frankfort, published in the consular reports for April, 1894, gas motor cars are in successful operation at Neufchatel and Dresden: a line of such kind is being built at Dessau, and a commission, headed by the government railway engineer, sent by the city of Nordhausen to examine and report on the working of the new system, declares it to be a practical success and recommends its adoption at Nordhausen.

Its main points are that the two miles of gas motors are three and three and one-third miles long; that gas cost $1.05 and $1.09 per 1,000 cubic feet at the two places, and is supplied from the ordinary street mains: and that the loaded car climbs a grade of six and two-thirds per cent at four miles an hour, while the speeds on low grades or levels is 11 miles and upward per hour. Figures are given from an address before the German Gas Association, of comparative costs of construction and equipment of a five-mile track line for overhead trolley, gas motor and horse car system, making the cost of gas motor system but little more than for the horse line, and considerable less than for the electric. The expert author of the address is quoted as stating that the net operating expenses of horse cars in Germany is five and one-half to seven; of electric cars, five cents and gas motor cars four cents, each per car kilometer: or, in other words, the gas motor system not only costs less for construction and equipment than the overhead trolley, and, consequently, much less than for a conduit system, but the expense of operation of the gas motor system is 20 per cent less than that of the overhead trolley.

We are indebted to the "Electrical Review" for the illustrations and information contained in this article.



CAR HOUSE—METROPOLITAN STREET RAILROAD.

METROPOLITAN STREET RAILROAD.

An Invention in Paper Making.

A new form of "dandy" roll has been invented for producing watermarks in paper. The watermarking of paper is ordinarily accomplished by means of a light revolving wire cylinder, upon the surface of which the letters or design are fixed. This necessitates the use of a separate "dandy" roll for every watermark. The new invention obviates this necessity, inasmuch as the watermarking letters or designs ars made interchangable, thus avoiding the removal of the roll itself. The saving in the number of rolls will be appreciated by the paper makers. A further advantage is that it will be possible to execute small orders with any special watermark at a small cost—simply the cost for lettering or design.

A TRIP TO WONDERLAND.

Something in Relation to Nature's Greatest Summer Resort.

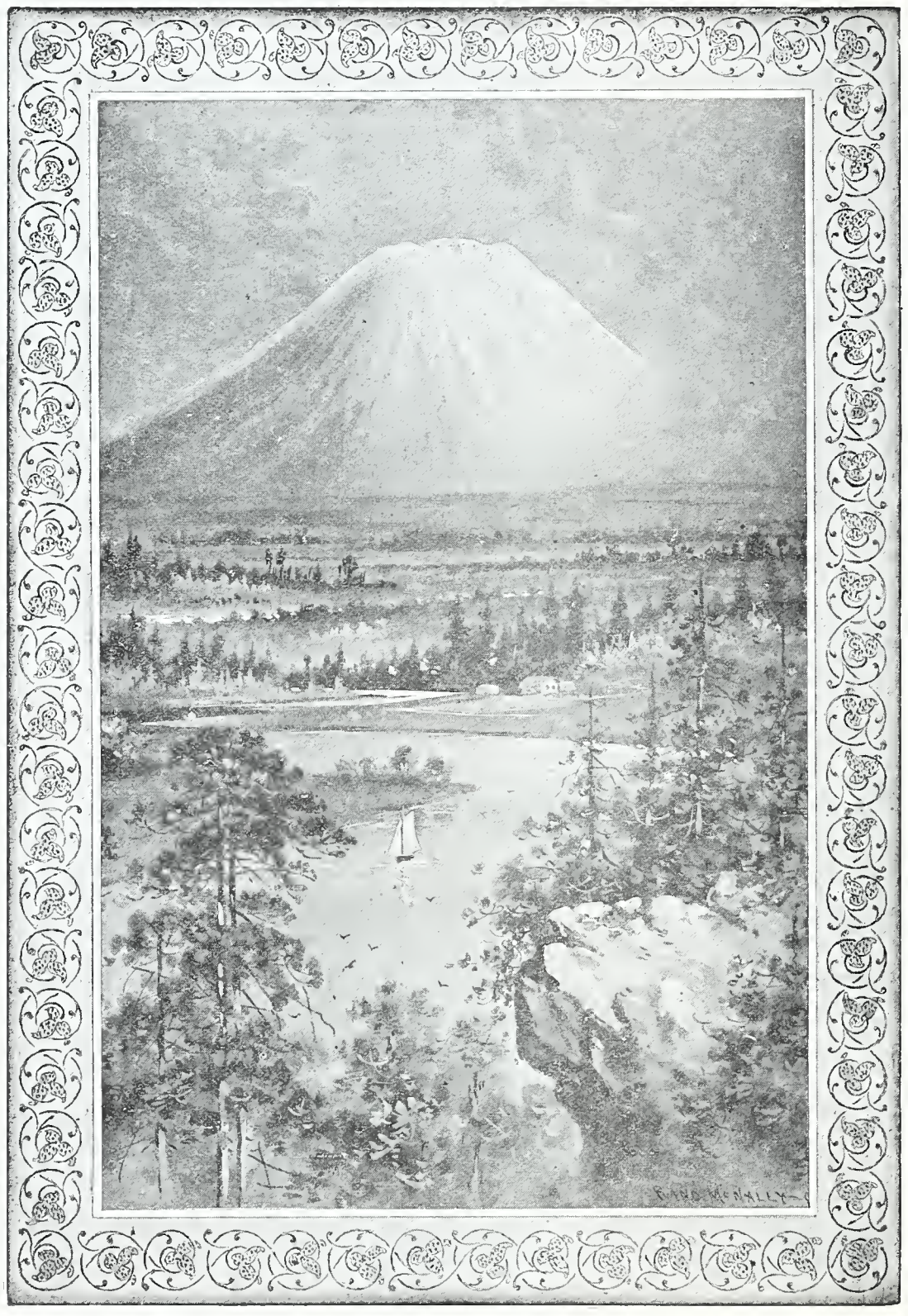
It is that period, brief, blissful and fleeting, which intervenes to distinguish late summer from early fall. The intensity of the sun's heat has moderated, as though, perchance, the orb were remorseful, as the disastrous effects of his too cordial smile upon sweltering humanity, to the alarming trial of humanity's patience and the saddening determination of humanity's morals. It is the pleasantest season of the year, when the days grow gradually shorter, the nights cooler, and more delightful, and when there is an universal yearning for communion with nature in the most visible of her forms to the temporary abandonment of the cares of business and the forsaking of the gossip and tattle and whirl of society.

We have decided, therefore, to bid farewell to the city, with its ceaseless din and clatter, its interminable rush and rustle of business and give ourselves over for a period of several weeks to the courting of unadorned nature; and certainly is it true that with no effort at adornment, we find her in the Yellowstone National Park, adorned with a raiment of scenic magnificence at which artifice pales and shrinks away ashamed and overawed, we find her in the very midst of a display ground, where she has set forth wonders of her own creation, as though to mock the insignificance of man's efforts with a combination of curiosities which are astounding in conception, overwhelming in creation and awe-inspiring in profusion. We see her at the snow-capped summit of a mountain, which she has raised to tempt our energies at climbing, and again in the damp, dark, forbidding depths of a gloomy canon, where she has rended apart two towering cliffs with a mighty wrench, and left between a yawning abyss, into which we look down and down and down, in dizzy wonder and with an awed sense of helplessness and insignificance and again we see her in the spray of a giant geyser, which at her direction belches forth at intervals torrents of boiling water, and then subsides again, as soothed by the same all-powerful hand. On every side she greets us with some bizarre display of her genius at conception and skill in creation, until we cry aloud in acknowledgment of the undisputed sovereignty of her sway.

And now we will board the Northern Pacific overland train at St. Paul and begin upon our thousand miles of journey westward to the Park region. The sunset splashes the western sky with brilliant colors and we thunder on, and on, and on, over miles of smoothly rolling landscape, and in the morning we awake in the midst of broad acres of waving wheat fields. Into and through this bread-basket of the west, and then out and over miles of rolling prairies, where roam countless herds of cattle and then into the Bad Lands—the wildest, weirdest region on the continent, a land of precipitous cliffs, and towering hills, and deep, dark gorges—a freakish territory, where nature's once fair face has been ravaged by volcanic eruptions, and seamed and scarred with fires and floods which raged in some prehistoric period. A few hours, and we are out and away again, over another stretch of gently undulating prairie, until we reach the entrance of the Rockies, and wind in and out to Livingston.

Here we will leave the train, and take the Park Branch to Cinnabar, where we begin upon our tour of the Park. A stage-coach ride of seven miles takes us to Mammoth Hot Springs, and here we are at last, fairly in the midst of wonderland.

Let us have lunch, and then start out with a guide to hunt up the springs. Far off across Gardiner river rises Mount Everts, with Ransen's Peak to the south and at our right, while all around us is a fantastic region, oddly designed and executed. We walk along up a cliff slope, and soon come upon myriads of springs, as clear and sparkling as though troubled by angels' fingers, as was Bethesda of old. It is an enchanted region, and we climb about grottoed cliffs, now encountering one new feature, now another, until we are spell bound. Surely nature has outdone herself! We are loth to leave, but we have just entered upon sight-seeing and must be away to see what new treasures of scenery will be unfolded to us, as we continue on our journey.



MOUNT RAINIER.

The trip through the Park, that is, the route which is taken by tourists to view the six principal points of interest, comprises about 150 miles of distance. It is made by stage, and the vehicle is long, low, comfortable and affords opportunity to see the landscape as we roll along. In the morning we start onward and upward, from Mammoth Hot Springs, through the Golden Gate, which must be seen to be appreciated—on past mountain streams through thick groves of trees, past Obsidian Cliff, a mountain of glass raised up by nature to afford us wonderment as we pass along the route, and then we reach the lunch station at Norris Geyser Basin. In the distance we hear the rumble and roar of angry geysers, and at intervals we see vapory columns of mud and water, spouted far into the air. We alight and walk about to see the Black Growler, the Mud Geysers, and the other curiosities of the region. Then for a ride through Gibbon canon, a craggy, defile, leading to the rough interior of the mountain region. And out again we travel to the Lower Midway and Upper Geyser basins. The Midway is the home of Excelsior, the largest geyser in the world. It is only active at interval of years, and when its time of activity has come, it rages with a violence which is alarming.

And again, later, there is Yellowstone Lake, a spot to kindle animation and excitement in any disciple of Isaak Walton. You drop your hook into its waters, and in a moment it is seized by some ravenous trout, whose appetite overcomes his prudence; and then, behold! you drop your fish into a cone-shaped elevation, just rising from the lake, and your trout is boiled, and ready to eat. The cone is the home of a hot spring, and nature here furnishes both food and the means to cook it, man having but to exert his ingenuity far enough to catch the fish. Perhaps we camp near the lake and pass a night, surrounded on all sides by towering mountain giants, whose images we see reflected in the clear waters of the lake. It is a delightful prospect, the heart of wonderland—a very climax of magnificence.

But again we are off, the Grand Canon, through Hayden's Valley, a beautiful park of itself, where we may see in the distance herds of buffalo, deer and elk. The Grand Canon of the Yellowstone has been excavated out of volcanic rocks made by the flow of the river. In height in ranges from 600 or 700 to 1,200 feet and is 24 miles in length. At the bottom it is barely wide enough for the passage of the water, but the sides recede until at the top it is in places hundreds of feet across—another piece of Nature's handiwork, stupendous in its grandeur. The whole park is an enchanted land, and strange to say its wonders are not appreciated by the people of the nation to which it belongs. Europe, to which tourists flock from the American continent, furnishes nothing to compare with it.

MOUNT RAINIER.

Farther west from the Cascade mountain range in Washington, arises the giant of the whole region, Mount Rainier, which stretches aloft fourteen thousand feet above the level of the sea. It is a volcanic cone, eclipsing all others in height, massiveness, glacial interest and grandeur. In the summer of 1894, the Northern Pacific road, believing the time had come when this peak should be brought more prominently before the attention of tourists, geologists and others interested in such subjects, authorized Olin D. Wheeler, one of its artists and writers, to organize a party for its ascent. This was done, and the party left Tacoma, Wash., July 31, returning to that place August 13, after having made a successful trip. And it is to Mr. Wheeler that we are indebted for much interesting knowledge of this, which he pronounces "the highest and mightiest of monutain chiefs." And his description of the mountain is such as to inspire enthusiasm to explore this region

and make the long ascent to the summit of the peak.

"For a vertical distance of about 8,000 feet downward," he says, "the mountain is covered with a glittering, polished enamel of ice and snow. How deep may be this beautiful surfacing, no man may know certainly. That in many places it is at least hundreds of feet is reasonably sure, while at other points, vertical cliffs for instance, it is just as certain that it is comparatively thin. Instead, therefore, of a mountain of black, rocky flanks, ridges and precipices, we find one with white, gleaming tops and sides, and bluish green ice precipices. From the upper part of this crystal field the glaciers spring. Down they drop, in sheer descent, hundreds and thousands of feet, twisting down through and filling from side to side the deep gorges which they and their children, the rivers, have gouged. Magnificent rivers of ice, brittle, almost colorless. gush by, transverse ice canons fascinating in their danger, they move slowly and remorselessly down brooking no opposition, to at last transform themselves into a roaring spring torrent, rushing on to the sea."

The mountain is surrounded by a tract of land 1,500 square miles in extent, which has been set aside as a forest reserve by governmental proclamation. This is Paradise Park, and it is aptly named. Its luxuriance of forest approaches the tropical; it is a botanist's paradise; camping spots with wood, water and all necessaries are numerous; and the number of tourists to the region is constantly increasing. In 1894 more than 700 visited the park, and gazed with awe upon Majestic Rainier. The accommodations for tourists have been increased and improved, and the tourist travel will increase likewise.

"It is not only as a field for scientific study, a place to view fine scenery, or to prove one's powers in feats of alpinery that I would write of Mount Rainier," says Mr. Wheeler. "It should become famed as a health resort. The soft, mild climate, tinctured with the odors and healthful properties of the balsamic forest; the satisfactory elevation of Paradise Park; the variety of scenery and the almost unlimited opportunity for out-door physical exercise must eventually tell in its favor."

At the Deering Reaper Works, Chicago, a reaper is finished every minute of the working day. The plant covers 52 acres of inclosed shop ground.

Vesuvius is again active. The crater of 1891 is rapidly filling, and a new cone, which is already sixty feet higher than the edge of the crater, is rising at the northwestern end.

The Japanese begin building their houses at the top. The roof is first built and elevated on a skeleton frame. Then it affords shelter to the workmen from storms.

Inventors—An English View.

Between the adoration of the inventor, as practiced in America, and the distinct discouragement of him which is fashionable in England, there is, says the London Electrician, a happy mean preferable to either extreme. The widely different attitude adopted toward men of many inventions on the two sides of the Atlantic has its origin in the widely different circumstances and characteristics of the two peoples. The groove which British forbears have been good enough to provide is so broad, and has led for so long in the right direction, that it seems to most Englishmen to smack of rank heresy, not to say gross disrespect, to suggest that the groove is also a deep one, and as difficult as it it is desirable to get out of. This sleepy self-satisfaction results in a certain irritating obtuseness to new ideas, and, indeed, to novelty of any kind, which, although of no small utility in the painless repression of fads and faddists of all sorts and conditions, forms an atmosphere which is not exactly suited to the delicate constitution of the inventor. Even in those countries in which the inventor is encouraged by legislation and public opinion. and where invention is more or less organized and directed to definite ends, the principle of encouraging originalty, admitted in theory, is with difficulty actually practiced; the effort to grasp new conceptions, the discomfort of getting out of an old rut into a new one, is too severe for most to take to kindly.

In a country, then, in which there is not overmuch legislative encouragment of the inventor, and no general public encouragement whatever the passive and active hindrances to invention becomes effective. Again, the typical inventor of the story-book and after-dinner speech, an individual who, it must be candidly confessed, has a real corporeal existence, is not calculated to win respect in any country where the narrow business spirit predominates. To begin with, the typical inventor is usually suffering from a very severe attack of enthusiasm; a grave disadvantage where business bargains and financial support of business men are the matters in hand. Furthermore he is, as often as not, completely ignorant of the industry which he has honored with his attentions; nevertheless, he is almost fanatical in his faith in the efficacy of and necessity for his particular device, and as a fanatic is quite unable in the nature of things to give reasons for the faith that is in him, he fares badly in the hands of any one wanting to know why it is absolutely necessary to adopt this or that improvement, and how long it will be before the returns come in. For the typical inventor, so called, it is impossible, indeed, to do more than obtain good-natured toleration.

It is not, however, says the Electrician, the technically ignorant or wildly enthusiastic inventor that the Americans publicly worship. A dash of enthusiasm is indeed no disadvantage, nor for matter of that a little technical ignorance; an over-trained mind is not likely to possess the freshness requisite for genuine invention. Graham, Bell, Elihu Thomson, Nikola Tesla—none of whom, by the way, are American born—are typical of the charater, bent of mind, and genesis of the trans-atlantic inventor. An inventor is as much a part of the bag and baggage of a big American manufacturing and engineering company as a works manager, head draughtsman or chief estimating clerk. They do not use steam-hammers to crack nuts with out there, and inventive geniuses are not expected to waste the greater portion of their time in deadening routine work. Not only are the pecuniary rewards large, but inventions are not, as with us, usually labelled with the name of the reigning Sovereign, or any other pointless appellation, rather than endanger the inventor's peace of mind—and his fidelity to his employers—by connecting his name with the mechanism he has devised.—*Electrical World.*

Spider Silk.

An authority on silk is quoted as expressing the belief that, if it could be obtained in quantity, silk from the spiders might be packed in bales and sent to Europe, where it would readily find a market for being carded and spun into silk threads for a sewing or weaving purpose. The fact that it would be difficult to procure the web free from dirt would detract from its value as compared with genuine silk waste, but still a price could be obtained that would pay for the trouble of collection. The spider from which it is proposed to obtain the silken mass is a tropical variety, which distributes its silk in great abundance on low plants and shrubs. It is suggested that it would be possible, with little trouble, to form a spider farm for the purpose of producing this silk in the greatest possible perfection and abundance.

English Patents.

It appears from the twelfth report of the comptroller-general of patents, designs, and trade-marks that last year 25,386 patents, 21,230 single designs, and 8,013 trade-marks were applied for, the number of patent applications being the largest in the group, though this was not the case with regard to the other figures. Of the 25,000 odd patent applications, 500, or 2 per cent, were made by women, about 100 being inventions connected with articles of dress.

The richest and most complete bath yet found in the ruins of Pompeii has recently been discovered. It is a large building, with sculptured basins, heating apparatus, lead pipes, and bronze faucets. The walls and floor are tiled. Everything is an almost perfect state of preservation, owing to the roof having remained intact when the city was buried in the year 79.

GREAT FALLS OF THE YELLOWSTONE.

MAMMOTH HOT SPRINGS.

OLD FAITHFUL GEYSER.

NOTES.

Largest Lamp in the World.—A Belgian inventor has devised an immense lamp, such as has probably never been seen before. It is composed of 3,000 pieces. six feet high, and measures 7.10 inches in diameter. It is fed with lard oil and the consumption is said to be very small.

* * *

A Monster Wheel.—The great wheel at Earl's Court, London, built upon the same general plan as the Ferris wheel at the World's Fair, has been completed and was opened to the public on July 6. The top of the wheel is 300 feet above the ground and about 40 minutes are required for a complete revolution.

* * *

Evolution of the Peach.—The peach is said to have been originally a poisoned almond. Its fruity parts were used to poison arrows, and for that purpose were introduced into Persia. Transplantation has not only removed its poisonous qualities, but turned it into the delicious fruit we now enjoy.

* * *

Long Distance Telegraphing.—By the connection of several different lines telegraphic communication was established between Derby and York, Australia, a distance by the wires of 7,246 miles. This is believed to be the longest telegraph line in the world. The rate of transmission was eleven words per minute. There were fourteen repeating stations.

* * *

The World's Supply of Tin.—Of the world's supply of tin more than half comes from the Malay Peninsula, from which place the output in 1891 was 36,061 tons out of a total world's production of 56,651 tons. Of the balance, 12,106 tons came from the Dutch East Indies, chiefly from Banka Islands, leaving but 8,484 tons for the rest of the world.

* * *

Longest Wire Span in the World.—The longest wire span in the world is the telephone wire crossing the Wallensee in Switzerland. The supports on shore, fastened to the rock, are the one 425, the other 1,180 feet above the level of the lake. The wire, which is said to be only 2 millometres (0.08 inch) thick, has a length of 7,850 feet. It is about 130 feet above the water.

* * *

Power of the Spectroscope.—In ordinary chemical analysis the one-hundred-and-twentieth of of a grain approaches very nearly the lowest limit of practical determination. The spectroscope, however, is so sensitive that it can tell the presence of a substance when the quantity is nearly two million times less than this, or two-hundred-and-forty-millionth of a grain.

* * *

Electricity in the Bessemer Process.—What may turn out to be one of the greatest inventions of the age was recently tested at the steel works and proved very successful. It was a plan for reheating steel by electricity under the Bessemer process. A heat was allowed to become somewhat "cold," and the electricity introduced. The effect was startling. The molten steel, about twenty tons, that was lying dead in the ladle immediately began to boil, and in a few minutes reached a white heat.

* * *

How Electricity Kills.—Death from electric shock is entirely due to the fact that the current produces a contraction of the arteries through an influence on the nervous system, and this constriction of the arteries causes a mechanical impediment to the flow of the blood which the heart is unable to overcome. Where nitro-glycerine or nitrite of amyl is given to counteract this effect, much larger quantities of electricity can be borne. While artificial respiration is often of great value in mild cases, when very large quantities of current pass, no rational means of resuscitation have as yet been satisfactorily proven in a number of cases.—*Popular Science.*

* * *

Deep Sea Waves.—Dr. G. Schott, studying the form and height of the waves of the deep sea, found that under a moderate breeze their velocity was 24.6 feet per second, or 16.8 miles an hour, which is about the speed of a modern sailing vessel. As the wind rises, the size and speed of the waves increase. In a strong breeze their length rises to 260 feet, and the speed reaches 360 or 364 per second. Waves, the period of which is nine seconds, the length 400 or 425 feet, and the speed 28 nautical miles per hour, are produced only in storms. Dr. Schott does not think that the maximum height of the waves is very great; his maximum is just 32 feet. He believes that in great tempests waves of more than 60 feet are rare, and that even those of 50 feet are exceptional. In the ordinary trade winds the height is five or six feet.—*Popular Science Monthly.*

* * *

Dissimilarity of Finger Tips.—We believe the Chinese were among the first to establish means of identifieation from the curious lines on the finger tips. Some others of the Oriental nations also practiced this device as means of signatures. With a bit of smoked glass and a sheet of clean paper most interesting experiments can be tried. The impressions left are very clear, and no two, even of the same family, are at all alike, each possessing distinctiveness quite as clearly marked as the features. In the case of twins, where they are so alike as to almost defy individual recognition, even by their friends, the lines in their finger tips proved to be very different. Mr. Francis Galton has lately produced some remarkable prints of the fingers of twins substantiating this. Mark Twain's well-known story "Pudden'-head Wilson" has for its basis the record of the finger tips of different persons, which were preserved by an eccentric lawyer to whom the odd soubriquet of "Pudden'-head Wilson" was given. The record of the finger tips was used as evidence in court to establish the identity of of the real hero, whom a little "Buttercup" had mixed up in childhood. In Mr. F. Galton's prints in the case of the twins, their photographs and measurements were closely alike, but the designs of the finger tips were entirely different. An enlarged photograph of a child's hand, 86 days old, shows the development of the distinctive little ridges on the skin, even at that early age.

Horseless Vehicles.

As an incentive to inventive genius and the evolving therefrom of a practical means of propelling street vehicles—the substitution of some power for that of animals—the Chicago Times-Herald has organized what may be called a horseless vehicle race, to take place in November, and for which large prizes are offered. As many of our readers will be interested in this subject and some may desire to compete for the prizes, the full terms and conditions of the proposed race are given herewith:

First prize—$2,000 and a gold medal, the same being open to competition to the world.

Second prize—$1,500, with a stipulation that in the event the first prize is awarded to a vehicle of foreign invention or manufacture, this prize shall go to the most successful American competitor.

Third prize—$1,000.

Fourth prize—$500.

The third and fourth prize are open to all competitors, foreign and American.

It must not be supposed that in this contest the question of speed is the only requisite to be considered. It would be possible for an ingenious mechanic to construct a machine with which he could easily outstrip all others in this contest, and yet the device would be of no utility and the outcome of no value to the world from a practical point of view.

It is the earnest desire of the paper that this contest shall add to the sum of our mechanical knowledge in this, the new branch of the science of transportation. In this spirit the following rules are laid dawn for the guidance of all who may desire to enter into the competition.

1. The date of the contest will be Saturday, Nov. 2, 1895. The judges may postpone the contest if in their judgment the state of the weather or the condition of the roads will not permit a fair trial.

The contestants will start at some point in or near the city of Milwaukee and will finish at some point in or near Chicago, not farther south than the south limit of Lincoln Park.

3. The contest is limited to automatic carriages, or, as they are more commonly known, "horseless carriages." There will be eligible to competition any and all vehicles having three or more running wheels, and which derive all their motor power from within themselves. No vehicle shall be admitted to competition which depends in any way upon muscular exertion, except for purpose of guidance. Competing vehicles which derive their power from petroleum, gasoline, electricity or steam, and which are provided with receptacles for storing or holding the same, will be permitted to replenish the same at Waugegan, Ill., and at Kenosha, Wis., but at no other points.

4. No vehiche shall be admitted to competition unless it shall comfortably carry not less than two persons for the entire distance, one of whom may have charge of the vehicle and the manipulation of the same.

5. No vehicle shall be admitted to competition except that it be free from danger, not only to its occupants but to spectators and the public users of the highway. The judges at their discretion may debar any vehicle which from its construction gives evidence of defects which would render the adoption of its type an evident impossibilty.

6. For the purpose of limiting the contest to vehicles of practical utility a preliminary test of all vehicles entered for competition shall be held by the judges on or about Saturday, Oct. 26, under such rules as the judges may determine on, and for such a distance as they may decide. At this test the judges may debar such constructions as in their opinion do not possess features entitling them to further consideration. It is stipulated, however, that all motor vehicles which won prizes or honorable mention in the Paris-Rouen contest of 1894 or in the recent race between Paris and Bordeaux shall not be compelled to compete in the preliminary test, but shall be admitted upon proper application to the final competition on Nov. 2.

7. In making awards the judges will carefully consider the various points of excellence as displayed by the respective vehicles, and so far as possible select as prize winners those constructions which combine in the highest degree the following features and requisites, rating them of value in the order named:

A. General utility, ease of control and adaptability to the various forms of work which may be demanded of a vehicle motor. In other words, the construction which is in every way the most practical.

B. Speed.

C. Cost, which includes the original expense of the motor, and its connecting mechanism, and the probable annual item of repairs.

D. Economy of operation, in which shall be taken into consideration the average cost per mile of the power required at the various speeds which may be developed.

E. General appearance and excellence of design. While it is desired that competing vehicles present as neat and elegant an appearance as possible, it should be assumed that any skilled carriage-maker can surround a practical motor with a beautiful and even luxurious frame.

8. All vehicles must be entered for competition not later than Sept. 15, 1895. All applications should be addressed "Editor Horseless Carriage Contest, Room 511, Times-Herald Building."

The date of the contest will not be changed from Saturday, Nov. 2, except for extremely bad weather or condition of the roads.

In answer to many inquiries as to how the carriages will be started it may be assumed that the judges will start them one or two at a time, keeping accurate record of the exact time each carriage passes the starting point, the same as is the rule in a yacht race. The various vehicles will be designated by numbers conspicuously displayed and a record will be kept of the time at which they pass various points along the road. Other less important rules will be formulated and officially announced by the judges at the proper time.

While two persons are fixed as the the minimum number of passengers carried, the judges will undoubtedly take into consideration the handicap imposed on vehicles conveying a greater number.

It is proposed to build a railway to India across the Arabian plateau at a cost of $75,000,000. The total length from Port Said to Kurrachee is estimated at 2,400 miles.

A single California county has 489 miles of irrigating ditches, constructed at a cost of $3,000,000. The total investment in the state for irrigating purposes is placed at $100,000,000,

---

It has been demonstrated in Florida that the best pineapples are those grown under sheds, affording protection alike from winds and frost and from some of the excessive heat of the tropical sun. The largest pinery of this kind ih the world is located near Orlando and covers about six acres and 60,000 plants. The pineapple plant grows to the heigth of from three to five feet.

One of the best known inventors in the country, William Randel, of Elizabeth, N. J., was a recent Washington visitor. Some years ago Mr. Randel filled a long-felt want by producing a machine that beat any existing system for making button-holes. His device is now in universal use, and he ought to have got millions out of it, but he didn't. Now he is to the front with a scheme for turning windows inside out so that they can be washed from the inside, saving a lot of trouble and danger, especially in tall buildings.

THE JAPS AS IMITATORS.

They Reproduce American Inventions and Disregard Patent Laws.

In a recent letter W. E. Curtis, the well-known Washington newspaper correspondent, now in Japan for the Chieago News, says:

A visit to the exposition at Kyoto or an examination of its catalogue is sufficient to convince anyone that efforts to build up an export trade in general merchandise from the United States to this country would be wasted. It represents an epitome of the progress of the people for the last twenty-five years, and demonstrates the facility and the accuracy of the Japanese in imitating the arts and industries of other nations. It contains in its department of manufactures a sample of almost everything that enters into tho wants of civilized men, and most of the articles are exact reproductions of inventions that are still protected by patents in Europe and the United States.

One of the weak spots in the national morals of Japan is the refusal of the government to make patent trade-mark treaties, for there is no protection whatever against piracy in Japan. Still, when you reproach him with this, the Japanese gives you an knock-down argument in defense of his country. As Mr. Matzudiara, the chief examiner in the Japanese patent office, who was a commissioner to the World's Fair, remarked the other day: "The United States and the European powers have refused to recognize Japan as a civilized nation. They have refused to submit their subjects to the protection of our courts, and have forbidden us to make our own tariff. They insist that their subjects in Japan shall be tried before their own consuls, under the laws of their own country, because our laws are not good enough for them, and they will not allow us to impose a duty of more than five per cent upon imported merchandise. Then they blame us for not being willing to make a treaty to protect their patents. Under the new treaties that take effect in 1899 Japan will become a member of the International Patent and Trade-Mark Union, and will give the inventions of foreigners the same protection that its own receive. If that is not satisfactory our government would be willing to have them go into effect to-morrow instead of four years hence."

While Mr. Matzudiara presents the selfishness of other nations in a forcible and truthful manner, it does not justify the wholesale robbery that Japanese manufacturers have committed upon American and European inventors. Two wrongs do not make a right in this or any other case, and it is not a fair example of ordinary Japanese equity. Every novelty and invention for which they have any use will be reproduced here within three months after it appears in the United States or London, and will be sold for about one-half of what it costs there. Every Japanese who goes abroad is always on the lookout for some useful and profitable process or article which his people at home may use. The Japanese merchants at New York, Chicago and other cities in the United States, as well as in Europe, are continually sending samples of popular designs and useful utensils to their friends at home, even toys and games and puzzles. The famous thirteen puzzle was sold by peddlers on the streets of Tokio within three months after it appeared in the United States, having been sent over by a Japanese merchant in New York. They have an advantage here in not being compelled to pay royalty as well as in the low price of their labor, so that when they acquire the inventions of foreigners they reproduce and sell the goods much cheaper than they cost at home. The Japanese are splendid chemists, also, and they are able to analyze patent medicines, chemicals and patents of that sort and manufacture them to suit the demands of their own market.

They have no respect for trade-marks, but imitate them on their own goods, even to the name of the manufacturers. It is bad enough to have them steal our patents, but when they put on labels like the genuine to deceive the public it is carrying a wicked practice a little too far and is adding insult to injury.

For example, you will find perfecting presses in nearly all the printing offices of Japan bearing the name of R. H. Hoe & Co., New York—the inscription being cast in raised letters upon the iron. Everyone of these machines were manufactured in Japan without the permission or the knowledge of the Hoe Company. Some years ago the American Trading Company imported half a dozen Hoe presses for a dealer in printing materials in Tokio and delivered them to the buyer at a cost of $250 each. A few months later Mr. Morse, the president of the American Trading Company, called on the local dealer to pay his respects, and found thirty or forty similar presses in his wareroom, all bearing the name of R. H. Hoe & Co., New York.

"Ah!" remarked Mr. Morse, "you are importing presses on your own account?"

"No," was the reply, "we are making them ourselves."

"But you have no right to put that name on any machine you make," exclaimed Mr. Morse with indignation.

"They cast them at the foundry in that way," was the answer; "but I do not see who is going to prevent us. There is no foreign patent law in Japan."

"But there is a moral law which every honest business man should recognize and obey, and while no one can prevent you from robbing the Hoe Company, you ought to be satisfied with stealing their machines only and not their reputation."

The Japanese machines were sold at $175 at a large profit, or $75 less than they cost in the United States.

The same is true of type-setting machines and other printer's supplies, and another notable example of Japanese thievery is offered by the local reproduction of Fairbanks scales. There used to be large shipments from the United States, but now they are imitated exactly, trade-mark, name, decorations and everything, and are sold at about one-half the price they bring in the United States. There is a large display in the exposition at Kyoto, and you can find them in almost every shop throughout the whole empire where goods are weighed. Indeed, the factory where they are made is commonly known known as the "Fairbanks Scale Factory," although the Fairbanks have not the slightest interest in the concern beyond the damage it does to their trade.

Mason & Hamlin organs that sell for $40 in the United States are manufactured in Osaka and sold for $17 to people who suppose they are imported from the United States. Singer sewing machines and other machines patented under the laws of the United States are reproduced here exactly, except that the table is made very low to suit the habit the Japanese have of sitting on the floor. They make their own telephones and electric light apparatus on American patents without asking leave or paying royalty. The telephone they have here is an improvement on that we are accustomed to in that it has two receivers, which are placed at both ears instead of one. You can also obtain the best English and American bicycles made in Japan for about half what the genuine articles cost.

I went into a hardware store the other day to buy a padlock and was shown a variety that looked very familiar. The shopkeeper brought out a box which he said contained genuine American locks, but it was difficult to distinguish them from the Japanese imitations. We finally selected one of Japanese manufacture which bore the words in English stamped in brass: "Automatic lock. Patent applied for," while the key bore the name of "Miller Lock Company, Philadelphia, U. S. A."

Some time ago a manufacturer of lamp burners in New England sent over a few beautifully finished samples which he desired Mr. Morse of the American Trading Company to introduce here. They were instantly popular and a large demand was created, which, however, suddenly ceased. The manufacturer inquired the reason and was informed that the Japanese were making them on their own account. He replied that it wasn't possible for them to produce as good a burner as he made and asked to see some of their samples. Mr. Morse went to the factory, got a full set and packed them himself so that there could be no mistake. They were exactly like the originals, even to a little trade-mark and instructions to the user stamped in the brass. When the New England manufacturer received them he insisted that they were his own and were part of the last invoice he had sent from his factory to Japan. I believe Mr. Morse has not yet been able to convince him that they are forgeries, but the same burners are now selling in every city of Japan for about one-third the price they bring in the United States.

You can buy Pears' soap, Beecham's pills and Worcestershire sauce of Japanese make that are put up exactly like the original—it is very difficult to tell the difference—and many patent medicines, tooth powders, cosmetics and other preparations for the toilet. Bass' ale, Porter's stout and Milwaukee export beer, made in Japan and bottled and labeled exactly like the original, are exhibited among the products of the empire at the Kyoto exposition. Eagle brand of condensed milk is also to be found there, and, what is more interesting to some of my Chicago readers, various samples of Armour's canned meats. There is no attempt on the part of the exhibitor to deceive the public. He is proud of his success as a forger, and when you tell him that Armour's beef is made in Chicago he assures you that his is exactly like the original, but is made in Japan.

I might give a list of other articles that would fill three columns of this paper. In fact, nearly one-fifth of the catalogue of the exposition is a record of patent robbery, and includes every possible variety of articles except, perhaps, agricultural implements. Nor do our mechanical tools seem to be suited to the Japanese taste. They prefer their own. They imitate our patent safety razors, but they insist upon their own old-fashioned saws.

Foreign inventors and manufacturers have tried repeatedly to test the question in the courts, but have been unable to obtain relief. They have also endeavored to secure protection by assigning their patent rights to Japanese citizens, but the patent office will not issue a certificate for anything that is not invented by a native. Trade-marks can be protected by having them secured in the name of a Japanese "sole agent," but they must be modified in some manner so as to be different from the original. The same can be done with copyrights, but no method has yet been contrived to protect patents.

The Japanese have an excellent patent system and patent office of their own organized upon the plan of that in Washington, and their laws and decisions have followed our own very closely. But when you come to complain that your property rights have been invaded and that your inventions have been stolen, they reply that they are only imitating the English plan, which has always been to take all you can get and give as little as possible. Foreigners, they add, are not willing to accept our judicial jurisdiction; therefore, why should we insist upon protecting their patents? This practice does not injure us any more than it does England, Germany and France. Perhaps we suffer less than they do. But the British are to blame for the situation, because they have always resisted the recognition of Japan as a civilized nation.

The only foreign patent or copyright that was ever protected in Japan was the English-Japanese dictionary, which represents twenty-five years' labor on the part of Dr. James C. Hepburn, the pioneer medical missionary of the Presbyterian Board, who came here in 1859, and was only recently relieved from his labors. Having passed four-score years, he is enjoying a well-earned rest at Orange, N. J. It was Dr. Hepburn who translated the Bible into Japanese, and no man has done more to introduce and promote Christianity and civilization in this country. Soon after his dictionary was published a pirated edition appeared, but the government, out of respect to him and in recognition of his usefulness, by an arbitrary decree forbade its sale within the limits of the empire, and a large number of copies in a Tokyo printing establishment were confiscated.

It is claimed that peroxide of hydrogen in combination with the electric current will bleach discolored teeth in a few minutes.

Secretary Herbert, acting upon the recommendation of a board of naval experts, has ordered that cellulose from the pith of cornstalk be substituted for that from cocoa fiber for use on war ships to prevent leakage through apertures made by shots from the enemy's guns.

It was supposed that aluminum was a mineral that would not tarnish or deteriorate under any ordinary use, but according to naval officers its use for naval vessels will not do at all. They say that specimens submitted to tests in salt water have practically crumbled to pieces.

Employes of the Boston & Maine have received the following circular, signed by the superintendents and approved by the general manager: "Your attention is called to the fact that you are not allowed to use tobacco in any form whatever while on duty, nor on trains or in stations when off duty with uniform or badge on. This rule is imperative, and must be regarded at all times."

Consul General Jones, at Rome, has sent to the State Department an account of a plan just patented in Italy by Louis Dini, a civil engineer, for building houses proof against earthquakes. It consists in erecting the building as though it were of one piece, by means of iron frames, rigid and inflexible. This would not suffice, continues the consul, unless the center of gravity was maintained at the base of the structure. Mr. Dini claims to have solved this problem.

It is found that wood possesses the power of doubly refracting electric waves, in the same way as tourmalin similarly effects light waves. Two concave Hertz mirrors, with the focal lines crossed, do not allow electric waves to pass, but the introduction of a plate of wood with the fibers at an angle of 45° to each of the focal lines is said to enable the waves to pass, much the same as light rays are allowed to pass on the introduction of a sheet of doubly-refracting substance between crossed Nicol prisms.

Rewards for Inventors.

According to an article in Engineering, a very early case in which the work of an inventor was rewarded is recorded by the celebrated Italian philosopher Jerome Cardan. In his work "De Subtilitate," which first appeared in 1550. he speaks of an artificer of Brixelendum who had invented, among other ingenious devices, a machine for sifting or bolting flour, for which he had obtained a privilege from Cæsar. Brixelendum, or, as it appears in some of the later editions of the book, Brixelensem, is probably the same as Brixellum, now Bresello or Bregella, a towe in Italy on the Po. The Cæsar referred to would appear to have been the Emperor Charles V, who held very enlightened views on government, which, unfortunately, his stormy reign prevented being carried into effect to any considerable extent.

Quoting from the French edition of 1556, Cardan explains that he alludes to the invention "in order that men may understand how it is possible to acquire great riches by little things, provided that they are ingenious. [This sentence reads very like some productions that we come across in our own days.] For now that the bakers have this instrument for their profit, and that the inventor has the privilege of Cæsar that no one can have it without his consent, he is so busy that in a brief time he has built a house." Cardan gives a sketch of the machine, which comprises a casing inclosing an inclined sieve provided with a knocking device operated by a hand-wheel outside the casing.

The earliest authentic cases of the grant of patents in England date from 1560. They are discussed in articles in Engineering, vol. xxxvii, pages 804 and 773, the former treating of the introduction of the manufacture of hard white soap, the latter of saltpetre, into this country. The first recorded instance of reward to an inventor occurs in the same year, when Jacobus Acontius, of Trent, was granted an annuity of £60, apparently as result of his petition in the preceding year for the issue of a prohibition against the usage, without his consent, of his discovery of wheel machines for grinding or bruising, and furnaces for dyers and brewers. It appears that a few years afterward he received a patent also.

In 1565 John Humphry, in the Tower, received a patent for the "sole use of a sieve or instrument for melting of lead, supposing that it was his own invention." He appears to have brought an action for infringement. In court the question was, as stated by Noy, "whether it was newly invented by him, whereby he might have the sole privilege, or else used before at Mendiff, in the West Countrv, which, if it were there before, the court was of opinion he should not have the sole use thereof." Emery Molyneux, however, in offering the Queen (Elizabeth), in 1570, his inventions of shot, artillery, ect., appears to have thought it a sufficient recompense to be allowed to enter her service. Another inventor, in 1575, brought forward "an engine of war whereby twenty-four bullets can be discharged from one piece at a time;" he wished for a pension. In the same year we have the application of Peter Morrice, a German, for a patent for the sole right of making and employing certain hydraulic engines for the raising of water, draining marshes, etc. A few years afterwards this invention was applied at Old London Bridge for the purpose of forcing up river water into the city for drinking purposes.

EDITOR INVENTIVE AGE:

Hermes had wings on his sandals as well as on his hat and on his back. I wonder if that is not merely a deification of the sandal, a tribute to its worth, as much as to say, You did so well for barefooted man on earth that you shall have an honored place in the Panthron. Well, with some such question in mind I have lately examined every pair of shoes that I could lay my hand upon. The Africans and Polynesians were of little service since in both countries everybody goes barefooted, until the Mohammedan and the slave catcher come along and introduce something presently to be described. But Americans, living and long since dead, have taken off the shoes from off their feet, all the way from Point Barrow to Cape Horn, Europeans, Northern Africans and all Asiaties have done me honor, both those who are my cotemporaries and some who lived four or five thousand years ago, to help me in my study.

In the light of THE INVENTIVE AGE this is a most wonderful series, because the rather uncomely pile are the legitimate ancestors of all modern foot gear. A new top boot with its various parts and fine stitching represents a long line of struggles with very great difficulties.

Among primitive peoples I find foot gear to be occasioned by rough ground, the turn at the toe and other attachments are defenses against bruises, while the top or vampand the stocking are to guard the foot from cold.

The style of the footgear is also dependent upon the region, whether it shall be of animal or vegetable substance and what species of these shall be used. Now the worse shoes or sandals in the world consist of two parts, the sole and the lashing or lacing. It is said of the Arabs about the Gulf of Aden that when a donkey dies in the road they cut his hide into shoes and shoe strings. Take a bit of hide somewhat larger than your foot all around, cut slashes or slits like button-holes around the margin. Reeve a long thong through these slits, over the back of the foot and about the heel and let the thing dry in place. That is the simplest rawhide sandal of America and of Africa. You find them in many places. By and by the people will have dressed leather for donkey hide and fine lacing for thong, but don't forget that all laced shoes whatever began as I have said.

The true sandal is a stiff sole with top lacing that includes toe string, instep string, ankle string and heel string. I mean that in every branch of the Caucasian race, in tropical America and among the Mongolian peoples you will find sandals with soles of hide or vegetal fibre in the greatest variety. Each sole has one or more strings coming up in front and passing between the toes or over the top of them, it also has a band around the instep holding the sole to the foot, it likewise has a loop hooked over the heel to keep the affair from slipping backward and finally there is some sort of loop or lug or strap attached to the margin of the sole just below the ankle on either side. The wild Aino, the old Mexican cliff dweller and the coolies all over the world will show you the identical thing that I am writing about. When you look at a complicated pair of Roman sandals with coupound sole, with extra heel, with toe string and instep band crossed and recrossed and extended on up to the knee you say, Oh well! when the Romans were savages they wore poor enough sandals, but when they wanted to walk rough shod over the world they had to invent something that would hold spikes in the soles and that is all there is about it. In looking over the Museum shoes I find that the peoples that had soft, flabby vegetal soles to their sandals either carried the toe strings over the tops of the toes, or had two or more toe strings. The Americans of old had two or more while the Spaniards had one; at least I think so, and I am going to beg you to look over your collection and let me know whether in aboriginal times any American savage wore a sandal with the string passing up between the first and the second toe only.

O. W. MASON.

A Land and Water Steamboat.

An interesting steamer is just about to be started on some lakes a few miles distant from Copenhagen, the peculiar feature being that the steamer has to make a short journey overland, the two lakes being divided by a strip of land. Across this a railway has been constructed, crossing a high road, which necessiates a gradient on both sides of 1:50, the metals being ordinary rails. At the two ends the rails have been carried into and under the water on a wooden structure. By means of piles the steamer is guided on the rails, which correspond in position with two wheels fixed on each side of the steamer. The steamer goes then on to the rails at "full speed," and travels up the rails on the one side and down the incline on the other, into the water, where the propeller again takes over its function. The engine is comparatively powerful, and in addition to the usual propeller shaft there is another shaft, which, by means of a chain, works the small wheels on which the steamer crosses the rails. The boat also has a powerful brake to moderate its speed down the incline. The steamer is 44 feet long, capable of holding seventy passengers, and the engine indicates 27 horse power. All the trials have passed off perfectly satisfactorily.—Scientific American.

G. A. R. National Encampment, Louisville, Ky. Reduced Rates via B. & O.

The B. & O. R. R. Co. will sell excursion tickets to Louisville and return at all ticket stations on its lines east of the Ohio river, at rate of one cent per mile each way for the round trip, for all trains September 7th to 10th, inclusive, valid for return journey until October 6th, inclusive. Tickets will also be placed on sale, via B. & O., at offices of all connecting lines. Stop overs will be allowed on the return trip.

Veterans bear in mind that all B. & O. trains run via Washington and Harper's Ferry.

WE have issued a special premium list for the purpose of giving the readers of THE INVENTIVE AGE a large selection of useful books and novelties at cost price.

How to Carry our Commerce in our Ships.

Untrammeled by considerations of expediency, ripe in experience and judgment, analytical and philosophical, unweariedly persistent, always logical and profoundly patriotic, our good friend Capt. W. W. Bates comes forth again with suggestions for the restoration of our Amercan marine in the foreign carrying trade that deserve the most earnest consideration of all who are desirous of seeing our flag restored to the sea, and which suggestions, also, merit at the hands of the next Congress practical adoption in the form of a comprehensive bill. Our last issue was largely occupied with a presentation ot Capt. Bates' views as to the "Elements of a Plan of Ship Protection." No profounder document was ever published in our columns. We are, probably, upon the eve of great events in the matter of restoring our shipping to the seas. The master hand, the profound student. the alert defender of our life and our liberty upon the sea, has marked the way unerringly. If we turn from his suggestions, the result of the most careful thought, enriched by a mind fertile in expedients, due to a comprehensive knowledge of the hidden processes by which other nations have supplanted us upon the sea, and the best means to overcome and forever to thwart these methods, we—the nation—are the losers.

Eight different ways are suggested, capable of a homogeneous union and adaptation to the one end—the restoration of our shipping to the foreign carrying trade. These suggestions are: *A Department of Commerce*, in order that the importance and the value of navigation and commerce may be kept prominently before the nation, in the Cabinet and in Congress; *Discriminating duties*, which means the collection of higher duties on imports in foreign than in American ships, in order to give preference to our ships in foreign ports in the placing of cargoes; *Limitation of Bonding Privileges*, so as to give American ships the advantage now almost exclusively enjoyed by foreign vessels; *Confining the Importation of Undutiable Articles to American Ships*, so as give the preference to American ships in the importation of such cargoes; *Export Bounties on Staples of Agriculture*, by confining such exports to American ships, as Great Britain did whe she paid an export bounty on agricultural staples; *Regulation of Indirect Trade*, by which he means confining the carriage of cargoes to the ships of the nation from whence the goods are received or ts which they are sent; *Confining the Carriage of Immigrants to American Ships*, in order that immigration may be regulated by our government, and our ships given employment; *Using Naval Cruisers as Mail Carriers, and the Carriers of Specie ana Express Package*, so as to give active employment and practical experience to our naval men, and preserve cruisers in constant readiness for war purposes.

All but last two suggestions have been applied by our own or other governments, and have given stability and strength to their merchant marine, and are, therefore, worthy of reenactment and steady support to the great end that we may once more carry our own foreign commerce in our own ships. A more patriotic or more statesmanlike duty than this does not demand the attention of Congress.—*Seaboard*.

Was it Mesmerism?

In Warwick, Mass., the other day, Mrs. Weisner, a Christian scientiest, chalenged Paul Goldsbury to clasp hands, the one that held on longest to be the victor. The clasp was not broken for eighteen hours, and then by outsiders. As the hours went on their friends remonstrated with them, but to no purpose. Signs of mental disturbance came after a night of hand-clasping, and friends who had watched them meanwhile constantly entreated them to desist. In the morning sharp words were spoken by friends, and in consequence Goldsbury and Mrs. Weisner went to the village commons, all the time clasping hands. There the friends determined that the couple should be parted by force if necessary, and Postmaster Sandson and William Shepardson told Mrs. Weisner and Goldbury that force would be employed unless the contest was stopped. They declined to unclasp hands, and then Sandson took Goldbury by the arm and pulled him from the commons to the street, but the clasp was unbroken. By main force the two men then parted the contestants. In order to subdue Goldbury it was necessary to take him to his summer home and tie him. He is still under the care of a nurse.

An invention designed to provide motive power for the gold fields of Western Australia has been patented in Glasgow. The invention contemplates the substitution of electricity and compressed air for the water power now in use. The Rothschilds and the government of Western Australia have become interested in the patent, and, it is said, a company will be formed with a capital larger than that of any stock company organized within the century.

New Patents For Sale.

Advertisements inserted in this column for 20 cents a line (about 7 words) each insertion. Every new subscriber sending $1.00 to THE INVENTIVE AGE will be entitled to the AGE one year and to five lines three times FREE. Additional lines or insertions at regular rates.

FOR SALE.—Patent No. 553,472. A device for tallowing culinary vessels for cooking purposes. Will sell on a royalty. Address, M. Kratky, Hemingford P. O., Nebr. 7-9

FOR SALE.—Patent No. 512,096. Derrick Hay Loader. Does away with cart. Puts whole cock of hay in a desired position or height on wagon with grappling fork. Address, W. C. Card Meade, Mich. 7-9

FOR SALE.—Half interest in my patents No. 525,039, for the United States and 47,893 for Canada. Collar Button Clasp and Shirt Combined, no collar button in neck band. A very valuable invention. A quick seller with large profits. Full information given on application. Address J. B. Wolgemuth, Mitchell, South Dakota. 8-11

FOR SALE.—Electric Heater Patent, No. 512,797, January 16th 1894, and improvements. The most economical and efficient car heater ever offered. Will sell entire, or part interest, and superintend manufacture if desired. Will take stock in a good company as part pay. Address Wm. J. Bowen, Electrician, Norwalk, Ohio. 8-10

FOR SALE.—My Coin Operated Automatic Newsboy, contains patented device for rejecting spurious coins. Effective. Device costs five cents. Will sell right to use to parties having slot machines not in competition. Address to M. M. Tomblin, Rockford, Ill. 8-11.

FOR SALE.—Patent, Patterns and Cuts of my Fence Machine; a success, and a good investment for small capitol. Send for circulars. W. H. Mason, East Monroe, Ohio. 8-10

FOR SALE.—Patent No. 537,341. Patented April 9th 1895, an Adjustable Rein Support. Will sell outright state rights or on royalty. Indispensible especially during fly time. J. F. Evins, Blodgett, Mo. 8-10

FOR SALE.—Outright or on royalty, my patent U. S., No. 540,322 and Canadian No. 47,856, being a supplemental stopper for ink bottles, (rubber) designed for use in schools, to prevent the spilling of ink. For particulars, address Helen Leadbetter, Kincardine, Ontario. 8-10

FOR SALE.—Patent No. 544,038. Dratt Gate for Fire Doors. Will sell outright at a very reasonable price. To manufacture the same will cost only 2 cents a piece. No drilling or filing necessary. Address, H. R. Hoffman, 1004 Central Avenue, Hamilton, Ohio. 9-11

FOR SALE.—Will sell patent No. 522,872. Garden Hoe for $3,000. One person will perform as much labor with the hoe as three persons with other tools. Very easy to work. Blades replaced when worn. J. H. Andre Lockwood, N. Y. 9-11

FOR SALE.—My patent No. 458,052. Hitching Post Attachment. A great improvement over all others, has been thoroughly tested. With good satisfaction, can be attached to wood or stone posts. Copies of patent and specifications sent to any one desiring to investigate a good thing with a view to business. Address, S. B. Hopkins, Council Grove, Kansas. 9-11

FOR SALE.—$1,000 will buy the entire U. S. patent to one of the most useful garden and field implements. Address, L. R. Fife, Livingston, Polk Co., Texas. 9-11

"BUBIER'S POPULAR ELECTRICIAN" is the name of a monthly publication which contains a vast amount of valuable information on all electrical subjects. Its department of "Questions and Answers" will be appreciated by students and amateurs desiring information or instruction on any problem that may arise. THE INVENTIVE AGE has made special arrangement whereby we can supply that popular dollar journal and THE INVENTIVE AGE—both publications one year—for $1.50.

Now the Time to Make Money!

Last month I cleared, after paying all expenses, $175.46; the month before, $149.93, and have at the same time attended to my regular business. I believe any one, anywhere, can do as well, as I have not a particularly good location and no experience. When you have an article that every family wants, it is very easy selling it. It seems strange that a good, cheap Dish Washer was never before placed on the market. With the Climax, which sells at $5, you can wash and dry the dishes for a family in two minutes, without putting the hands in water; as soon as people see the Washer work they want one, and that is why so much money can be made so quickly. For full particulars, address The Climax Manufacturing Co., Columbus, Ohio. I feel convinced that any lady or gentleman, in any location, can make from $5 to $10 a day, as every family will very soon have a Dish Washer. Try it, and publish your experience for the benefit of others.

BUSINESS SPECIALS.

Advertisements under this heading 20 cents a line each insertion—seven words to the line. Parties desiring to purchase valuable patents or wanting to manufacture patented articles will find this a valuable advertising medium.

R. U. asleep? Listen! We'll pay U $5 for every new student, who pays entire tuition in advance, Milwaukee Correspondence School of Practical Bookkeeping, 828 Vliet St., Milwaukee, Wis. (13 years practical experience.) 6-9

WANTED.—A firm to manufacture on a royalty my dusting cloth holder for broom handle. No competition. Inexpensive to manufacture. Patent No. 538,269. Correspondence solicited. Address, H. Neagles, Lynn, Mass. 8-10

WANTED.—We have work for a short time for one draughtsman in each town. Address J. H. Snow & Co., Mechanical Engineers, Indianapolis, Ind.

WANTED.—A reliable firm to manufacture and sell a game on royalty, patented by me in this country, Canada and Great Britain. Address Lieut. H. H. Sargent, 2d Cavalry, Regimental Quartermaster, U. S. Army, Fort Wingate, New Mexico. 8-10

WANTED.—The Perfection Lock Tie. The best known agents wanted everywhere. Circulars and prices free, would contract on royalty or sell whole U. S. Patents. Address, J. R. Eichenberger, Patentee, Burton City, Ohio. 9-11

Electric.

The electrical resistence of German silver is, in round numbers, 13 times that of copper, and the resistence of iron is 6 that of copper.

THE St. Paul, Minn., board of aldermen has passed a resolution ordering that electric arc lights of 2,000 candle power be placed on all the principal downtown streets. The city is now using gas.

THE second 5,000 horse power generator at Niagara Falls was started on July 27 and is now under test. There was no hitch in the starting and the big machine is running satisfactory.

The discharge of small storage cells should be limited to 1¼ ampres per plate: of large cells 2½ ampres per plate. A battery should not be allowed to remain discharged longer than two days.

ENCOURAGED by the success of other storage batteries in Paris, notwithstanding the unsuccessful experiments in this country, the Fourth avenue horse railway company in New York has decided to equip their line with chloride accumulators—the Electric Storage Battery Company of Philadelphia having the contract.

THE Chicago and Northern Pacific and the Chicago, Burlington and Quincy railroads are about to substitute electricity for steam on their suburban trains out of Chicago, and in the case of the Northern Pacific it is intended to eventually substitute electricity for steam on the entire line.

ELECTRIC railway companies in New York state will not be slow to take advantage of the law, which has recently become such by the signature of the Governor, which gives to electric railway companies the same rights under condemnation proceedings as are enjoyed by steam railroad companies.

TROLLY parties have become quite the fad in Philadelphia and score of beautiful "party cars" are now being run. A party recently organized for the benefit of the German Hospital. It comprised sixty-one cars loaded with 3,000 people. The head car contained the famous Gambrinus band.

A COMMISSION appointed by the Massachusetts Supreme Court, consisting of ex-Governor William E. Russell, James Renfrew and Theodore C. Bates, has decided that the city of Chicopee must pay $27,000 for the plant of the local electric lighting company. The transfer is set for October 1.

The directors of the electric road from Auburn to Port Byron, N. Y., are much pleased with the outlook and feel confident that the road will prove a paying investment. They announce that the road will be ready about July, 1896, and will be known as the Auburn Interuban Electric Road.

The business of the St. Louis Electric Light and Power Company is increasing at a rapid rate, there being over 500 customers now on the company's books for light and power. The company have contracted with new patrons for 2500 more incandescent lights during the past four weeks.

The electric light wires on Fifth avenue, Pittsburgh, all that remain of the great network of a few years ago, will soon be removed. The Allegheny County Light Company has completed one conduit along Smithfield street and has the work on another along the west side of the street well under way. Both conduits lead from the electric light plant on Twelfth street.

THE INVENTIVE AGE can recommend the "Climax" watch, advertised in another column, as being, undoubtedly, the best stem-winder watch for the price in the market. It is a good time keeper, and either a plain or imitation engraved cases can be had. This watch is fully timed and regulated and fully guaranteed for one year, the same as Waltham or Elgin.

Aftermath.

THE Milwaukee Bridge & Iron Co. has erected a large and well equipped bridge plant on the site of its old shop.

SNYDER & FISHER, Little Falls, N. Y., will erect a new building which will be used in the manufacture of bicycles.

THE Consolidated Barb Wire Co. will make additions to its Joliet, Ill., plant, increasing the capacity of the wire mill and wire nail mill.

ROUSE, HAZARD & Co., Peoria, Ill., will erect a new factory for the manufacture of bicycles in the near future. The building will be 60x280 feet.

AN electric plant and a machine shop are being added to the Braddock, Pa., plant of the Consolidated Wire & Steel Co. The rod and wire mills are to be enlarged.

P. P. LOOMIS, of Bound Brook, N. J., will remove his business, the manufacture of electrical machinery, to Newport News, Va., where a new building will be erected.

IMPORTANT additions are being made to the Lochiel Rolling Mill, Harrisburg, Pa. Five puddling furnaces are being completed, which with other improvements will add 100 men.

THE Leechburg Bridge Co., has been incorporated at Leechburg, Pa., with a capital stock of $20,000, by Andrew Gunder, Frank J. Beale and George Kulpshield.

THE Bicycle Keyless Lock Co. has been incorporated at Minneapolis, Minn., with a capital stock of $25,000, by J. A. Folsom, W. A. Chowen and Chas. L. Wright.

THE Kuhlman Safety Coupler Co. has been incorporated at La Crosse, Wis., with a capitol stock of $100,000, by Adolph F. Kuhlman, E. W. Chamberlain, C. F. Klein, W. T. Symons and Jos. Roth.

THE Commissioners of the District of Columbia have decided to grant the United States Electric Lighting Company a permit to replace its line of poles on Thirteen and One-Half street.

THE Niles Tool Works, of Hamilton, O., has equipped the shops of the Kansas City, Pittsburg and Gulf railroad at Pittsburg, Kan., with a complete outfit of shop tools.

THE erection of the buildings to be occupied by the Sprinkle Pulley Works, at Maysville, Ky., is progressing at a rapid rate. The main building will be two stories high and 126x55 feet in dimension.

WORK has begun on the foundation of the Westinghouse Electric and Manufacturing Co.'s. malleable iron works at Wilmerding, Pa. It will be next to the machine shops, will cost $50,000 and will employ 800 men.

A. W. REMNITZ, local representative of the Hoppes Manufacturing Co., Springfield, O., is meeting with gratifying success in introducing their feed water heaters and purifiers in this and surrounding territory.

THE St. Louis, Iron Mountain and Southern has lately received 10 new passenger locomotives from the Baldwin Locomotive Works. These engines are designed for fast passenger service, and are equipped with all the latest improvements.

S. WILKS Manufacturing Co., 123 South Clinton Street, Chicago, manufacturers of water heaters and tanks, report their plant as fully employed, with a prospect of increased business, as the approach of cold weather will stimulate their line of trade.

AMONG the recent orders filled by the Bickford Drill Company, of Cincinnati, was one for two large radial drills to be shipped to the Transvaal, South African Republic. This makes nine that have been shipped there during the past few months.

THE new plant to be erected by the recently incorporated Franklin (Pa.) Steel Casting Co., will be a steel frame with corrugated iron covering. There will be three buildings which will be 45x170, 60x170 and 25x170 feet. The plant will be thoroughly equipped with modern machinery.

M. C. HENLEY, Richmond, Ind., is now engaging in the manufacture of bicycles and proposes to turn out 7,000 wheels annually. His Henley Bicycle Works have ordered from the Lodge & Davis Machine Tool Co., Cincinnati, such machines as are particularly adapted to the manufacture of bicycle parts.

A syndicate, which includes a number of Philadelphia capitalists, has purchased the rights of a power company which was recently formed to develop the Sault Ste. Marie Canal, and has organized the Lake Superior Power Company with a capital of $2,000,000. The company has two large mills, and expects to operate the one on the Canadian side within a month. It is proposed to make paper pulp. The plant on the American side will be located at Sault Ste. Marie, Mich., but will not be in operation for some time. Among the Philadelphians interested are H. A. Berwind, of the Berwind-White Coal Company; Samuel R. Shipley, and Edward V. Douglass.

INVENTIVE AGE BUILDING.

PREMIUMS TO SUBSCRIBERS.

Read the following offers to new subscribers:

OUR $1 OFFER.

THE INVENTIVE AGE one year and two copies of any patent desired, or one copy of any two patents..... $1 00

THE INVENTIVE AGE one year and a list of 50 firms who manufacture and sell patented articles..... 1 00

THE INVENTIVE AGE one year and Altograph map of the City of Washington 1 00

THE INVENTIVE AGE one year and a five line (35 words), advertisement in our "Patents For Sale," or "Want" column, three times..... 1 00

For $1.

THE INVENTIVE AGE and any one of the following Scientific books:

How to Make Electric Batteries at Home, fully illustrated, by Edward Trevert.

Everybody's Handbook of Electricity, illustrated, by Trevert.

How to Make a Dynamo, by Trevert.

Practical Directions for Electric Bell Fitting and Electric Gas Lighting, by Trevert.

Elihu Thompson's What is Electricity?

OUR $1.35 OFFER.

THE INVENTIVE AGE one year and Joseph Allen Minturn's famous book "The Inventor's Friend," indorsed by such high authorities, as Dr. Gatling, Clem Studebaker and others,.....$1.35
Book alone 50 cents.

THE INVENTIVE AGE one year and any one of the popular and instructive books as per offer in another column, under heading of "Popular Scientific Books."..... $1.35

THE INVENTIVE AGE one year and any one of the "Excelsior Edition of Standard Poets," mentioned elsewhere in this magazine,..... $1.35

THE INVENTIVE AGE one year and a copy of "Picturesque Washington," 260 pp., 136 illustrations, Stilson Hutchins' famous book, former price $2, sent to any address in the United States..... $1 35

THE INVENTIVE AGE one year and The Peoples' Atlas of the World, one of greatest bargains ever heard of; size of Atlas 14 x 22 open; latest maps and statistics; handsomely illustrated, a $2 book with AGE one year—both for.... $1 35

☞ See another column for other offers.

OUR $1.50 OFFER.

THE INVENTIVE AGE one year and Robt. Grimshaw's famous book "Tips to Inventors"..... $1 50

Address all communications to
THE INVENTIVE AGE,
Washington, D. C.

Cantwell & Company, Patent Agents, Calcutta, India.

We have received from this well-known and long established firm in the east their handy little phamphlet which deals fully with the laws and regulations appertaining to the taking out of Patents and registering of Trade Marks in India and other Eastern countries. It will be found a very useful adjunct to the file of Patent Agents in this country and more so to those in this city, the headquarters of the fraternity. The manual contains a list of charges which we think are very moderate, and, which will we feel sure fill a long felt want in that direction.

A junior member and representative of the firm, Mr. Harry Cantwell, is at present in this city which he proposes to make a permanent residence.

All communications to him with reference to any information regarding Patent Practice in the East may be directed in care of the Inventive Age office, Washington. We may add that the above firm are the sole agents for the "Inventive Age" in India, British Burmah and Ceylon.

Want a Fountain Pen?

One of the very best in the market, a standard article, warranted, will be sent as a premium with THE INVENTIVE AGE. The retail price of the pen is $2.75. We will send the AGE one year and the pen for $2.75.

SUPPLEMENT.--Tips to Inventors.

The Infancy of Invention.

As capital is constantly being invested and expended to protect and preserve capital previously expended and invested in various enterprises all over the land, so will inventions continue—their variety and multiplicity being demanded to further the usefulness and perfection of inventions previously originated.

It was Edison who, replying to the question, "Do you think that the inventions of the next fifty years will be equal to those of the last?" said: "I see no reason why they should not. It seems to me that we are at the beginning of inventions." The truth of this prediction is illustrated in the many useful and wonderful achievements of Mr. Edison's own laboratory since giving utterance to this statement only a short time ago.

Profits from Invention.

The value of an invention is determined by no fixed rule. Fabulous sums have been made from simple and novel, as well as complex and useful, inventions. It is a fact that four-fifths of the business of the United States is transacted by the use of inventions. The benefits to mankind because of inventions, are so manifest and so common we are apt to look upon them in a matter-of-fact sort of way and fail to give the inventor the credit due him. In the majority of cases, however, the failure of an inventor to reap a reward is attributable to his own negligence, lack of forethought and indiscretion.

Nearly every human being is an inventor, but only a few obtain a *monopoly*—a patent—on the product of their brain. There are thousands of really useful articles, appliances and discoveries, in use every day by millions in all walks of life, that might have been patented had the inventor possessed the business sagacity that has actuated his more fortunate neighbor. Take for instance the open slot necessarily used in all conduit electric, or cable street railway systems. The inventor failed to get a patent on the idea and a fortune missed him.

There is money in inventions, but not always for the inventor.

The only way to make money out of an invention is through the protection afforded by a patent; not a patent in name only, but a *good patent*—one that is intelligently drawn, with claims commensurate with the scope and importance of the invention.

The profits arising from inventions in the electric field during the past twelve years have been simply astounding. In railway appliances, bicycles, typewriters, telephones, cash registers, slot machines and farm machinery, the field has been equally remunerative. And just think of that simple toy "Pigs in the Clover"—it netted the inventor, whose friends laughed at him for obtaining a patent on so simple a toy, over $150,000. The inventor of the metal plates to be attached to the worn heels of shoes (for sale in all cities) realized a fortune out of it amounting, it is said, to nearly $1,000,000. Perforated wooden seats for chairs and rubber tips for lead pencils brought the inventors big results. Howe made a million dollars from his sewing machine attachments, and the inventor of that simple lamp attachment, the inverted glass bell, to be suspended over lamps to protect the ceilings from being blackened, made the inventor rich. The "Darning Weaver," a device for repairing stockings, is a useful invention and is netting the inventor a handsome revenue on royalties. The wire nail and gimlet-pointed screw are fortune makers, and wire nails caused the invention of automatic machinery that manufacturers them so cheaply it does not now pay the carpenter to spend his time in picking a nail up when it drops, if it requires ten seconds to do so. The inventor of the well-known "safety pin" lived in luxury all his life, after discovering a means of concealing the point of a pin in such manner as to prevent scratching. The inventor of roller skates made nearly a million and the inventor of the needle-threader for a long time made $10,000 a year.

Relation of Capital to Invention.

Mr. Edward P. Thompson, one of the most entertaining writers on the subject of invention, says that "every invention, before the introduction into practical use, passes through two stages; namely, mental and physical"—mental when in the mind of the inventor only, and physical when the mental invention is put into bodily form by hand, or by hand with the assistance of a convenient tool. "A mental invention," says the writer, "sometimes does not become a physical invention because the inventor lacks money, technical knowledge or diligence. Such a mental invention often becomes a physical invention by the assistance of a capitalist, an educated person, or diligent companion." This being true the *mental* inventor, the person who, for lack of means possibly, would fail to make his invention a physical reality—such a person should take into his confidence a friend or companion to share the prospective benefits of his invention. Thousands of meritorious mental inventions are never worked out because of the over-timidity of the inventor, his exagerated greed for *all* the benefits to accrue instead of half the loaf, which in many instances is, or would have been, ample reward. Mr. Thompson truly says: "Inventors and capitalists should be more willing to co-operate. It is too often the case that the former must pay for his own experiments and all patent costs before a capitalist will even take the trouble to look into the merits of the alleged invention. On the other hand it is too often true that the capitalist seeks to join with the inventor, but the latter wants too high a price at the beginning."

Who Can Apply for Patents.

Patents are issued to any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or new and useful improvement thereof, not known or used by others in this country, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned; and by any person who, by his own industry, genius, efforts and expense has invented and produced any new and original design for a manufacture; any new and original design for the printing of fabrics; any new and original impression, ornament, pattern, print or picture to be printed, painted, cast, or otherwise placed on or marked into any article of manufacture, or any new, useful and original shape or configuration of any article of manufacture, the same not having been known or used by others before his invention or production thereof, nor patented or described in any printed publication, upon payment of the fees required by law and other due proceedings had.

If it appears that the inventor, at the time of making his application, believed himself to be the first inventor or discoverer, a patent will not be refused on account of the invention or discovery, or any part thereof, having been known or used in any foreign country before his invention or discovery thereof, if it had not been before patented or described in any printed publication.

Joint inventors are entitled to a joint patent; neither can claim one separately. Independent inventors of distinct and independent improvements in the same machine can not obtain a joint patent for their separate inventions; nor does the fact that one furnishes the capital and another makes the invention entitle them to make application as joint inventors, but in such case they may become joint patentees. The receipt of letters patent from a foreign government will not prevent the inventor from obtaining a patent in the United States, unless the invention shall have been introduced into public use in the United States more than two years prior to the application. But every patent granted for an invention which has been previously patented by the same inventor in a foreign country will be so limited as to expire at the same time with the foreign patent, or, if there be more than one, at the same time with the one having the shortest unexpired term, but in no case will it be in force more than seventeen years.

Protection to Inventors.

What is a patent? It is a monopoly or grant, in the United States, for a term of seventeen years, to the patentee, his heirs or assigns, of the exclusive right to make, use and vend the discovery throughout the United States, as the inventor's rights may appear in the specifications and patent granted.

This means a great deal to the inventor who has secured a *valid* patent containing all the claims so worded as to prevent infringement and loss in contest. Thousands of inventors, obtaining patents through unreliable and inefficient attorneys or agents, find themselves possessed of patents *in name only*, and of no value when combatted by infringers with capital and the aid of able legal talent. A good patent costs no more than a weak and worthless one. Therefore how shortsighted are those inventors who employ cheap attorneys, saving $5 or $10 in fees, only to find themselves loosers of *all* they have paid when the contest comes.

The Need of Reliable Attorneys.

The Revised Statutes of the United States provide that "before any inventor shall receive a patent for his invention, he shall make application therefor in writing to the Commissioner of Patents, and shall file in the Patent Office a written description * * * of the same in such full, clear, concise and exact terms, as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct and use the same; and in case of a machine, he shall explain the principle thereof and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions."

To carry out these provisions it is necessary for the inventor to first make a clear, concise and complete drawing, or a working model of his invention or discovery, and send it to THE INVENTIVE AGE, or some thoroughly reliable attorney, who, before making application for the patent, should make a thorough and rigid examination of the Patent Office to determine upon its novelty or patentability. If the invention has been anticipated by some one else, or if it lacks novelty, or if for any reason a patent can not be granted, or, if granted, would be of no worth or value, then the inventor does not want to incur the expense of making application and paying attorney's fees and government fees. For making this thorough examination THE INVENTIVE AGE and all reliable attorneys charge $5, which fee is, under some circumstances, however, taken out of the additional fees paid by the inventor in case letters patent are applied for. The fees of patent attorneys vary somewhat, but the average fees for obtaining a United States patent are about $65—the government fees being $15 on filing the application and $20 on issuing a patent—the balance being the fees for preparing specifications, making searches, etc. The inventor is sometimes favored in terms given for payment of the fees, more detailed information regarding which can be obtained by enclosing a 2-cent stamp with enquiry to THE INVENTIVE AGE, Washington, D. C. The reason why the inventor should have a preliminary examination of the Patent Office made before applying for a patent lies in the fact that if the case is rejected the fees paid to the government and the attorney are lost

All patents obtained through us will receive special mention in THE INVENTIVE AGE and in cases of unusual merit inventions will be illustrated free of charge to our clients.

This publication, reaching capitalists, manufacturers and business men throughout the world, is of value in assisting to bring an invention before the public in case its promotion or sale is desired by the patentee.

And What Do You Think of This?

JUST OUT! BRAND NEW! ENTIRELY ORIGINAL!

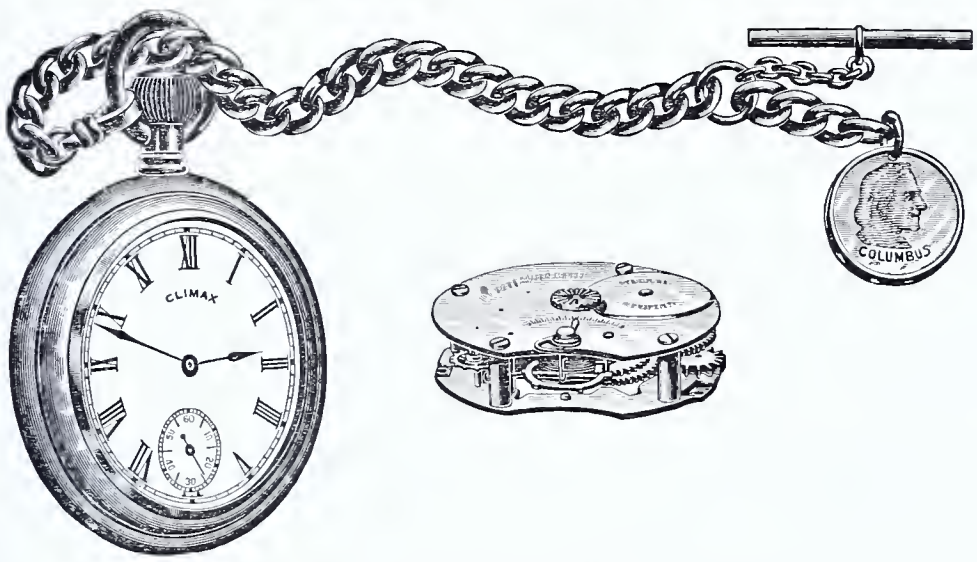
$2.

An American Stem-Winder.

A DUPLICATE IN QUALITY, APPEARANCE SIZE, ETC., OF ANY AMERICAN WATCH SOLD FOR LESS THAN $10.00

Our Watches are Positively and Unequivocally Guaranteed.

THE CLIMAX



EITHER ARABIC OR ROMAN DIAL.

This is the CLIMAX up to date. It represents the most important step taken in Watch evolution in many years. It describes a line beyond which nothing radical will pass for years, not only in the matter of PRICE, but QUALITY. The movement comprises many original patented features, and has been for years the subject of constant labor by one of the foremost of the foremost of expert and inventors.

DESCRIPTION.

CASES.—Two Styles. Plain and Imitation Engraved. Two Finishes, Solid Gilt and Nickel. Two Dials, Roman and Arabic. Snap Back. Heavy Bevel Crystal. Regular Stem Wind. Inside Stem Set. Regular 18 size Case. Chains assorted in each dozen.

MOVEMENT.—Regular American Lever, Lantern Pinion, Quick Train, 240 Beats per Minute Three-quarter Plate, Short Wind, Runs 30 hours to one winding. Dust Cap over Movement.

Fully Timed and Regulated, and FULLY GUARANTEED for one year, the same as Waltham or Elgin.

The Cheapest Stem-Winding Watch Ever Produced.

PRICE $2. With "THE INVENTIVE AGE" one year, $2.50.

JUST PUBLISHED.

How to Build a One-Fourth Horse-Power Motor or Dynamo.

By A. E. WATSON.

Illustrated with full working drawings.

PRICE, PAPER, 25 CTS. CLOTH, 50 CTS.

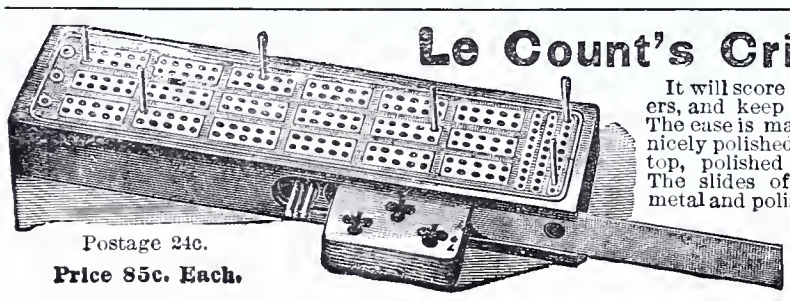
Address "INVENTIVE AGE," Washington, D. C.

THE STAR FOUNTAIN PEN.

A solid 14 karat gold pen in highly finished hard rubber holder. The only fountain pen that will give perfect satisfaction, sold at less than $2.50. We warrant it in every particular and refund money when it is not satisfactory. A gold pen alone of the same value costs in any retail store more than we charge for the whole outfit. Writes 25 pages fools cap to one filling.

By mail, **$1.50** each; **$12** per dozen.

With "Inventive Age" one year, $2.



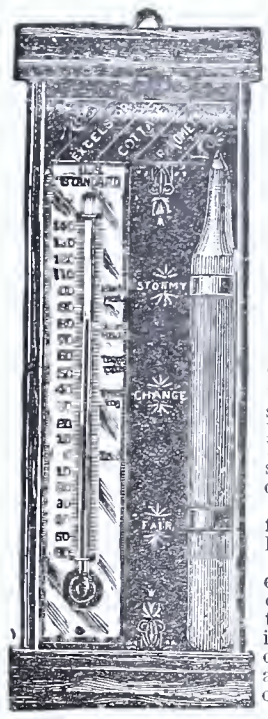
Le Count's Cribbage.

It will score for three or six players, and keep tally of the games. The case is made of black walnut, nicely polished; has a solid metal top, polished and nickel plated. The slides of compartments are metal and polished. This Board is superior to Boards that sell for three times the price. Full directions with each Board.

Postage 24c.

Price 85c. Each.

With "Inventive Age" one year, $1.60.



THERMOMETER & BAROMETER COMBINATION.

Combination Barometer and Thermometer.—Our well known leader. Blue and Gilt back with metal side posts. Fancy top and bottom and handsome enough to decorate the home of a millionaire. Extra well made and dependable on for showing changes in both weather and temperature. One of the biggest bargains in our list. A handsome thermometer, together with a glass tube containing a chemical preparation which rises and falls by action of the atmosphere, foretelling correctly all changes in the weather. This is a new style storm glass and the most reliable ever known, being in use in all signal service stations. The slightest change in the atmosphere in some way affects this glass. The thermometer is also of the best quality. Both are enclosed in a stand with walnut top and bottom and blue and gilt back. On either side is also a strong metal bar giving the whole great strength and adding to its appearance. Altogether it is a most remarkable combination for the price and we take pleasure in offering it to our patrons

This is not one of the many cheap combinations of which the market is flooded which are neither good for ornament or use and can never be relied upon to forecast either the weather or in fact any thing else.

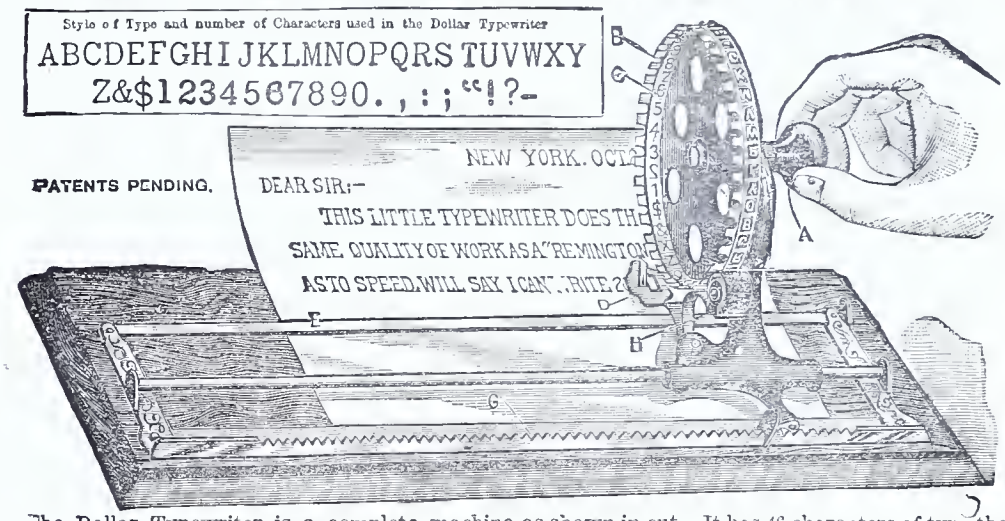
There is no reason for you to depend on the weather Bureau reports as every person who owns one of our Combinations, can make his or her forecast and tell exactly when it will be fine, rainy and in fact every change in the weather. With this you can tell whether to put on rubbers and a mackintosh or a pair of summer shoes and a costly dress. Don't take any more chances about the weather but be prepared. Each one packed securely in a neat box so that they can be mailed up without any fear of getting broken or damaged. Postage 10c. **Price 32c. Each; $3.00 Doz.**

With "Inventive Age" one year $1.25.

THE DOLLAR TYPEWRITER.

A PERFECT TYPEWRITING MACHINE.

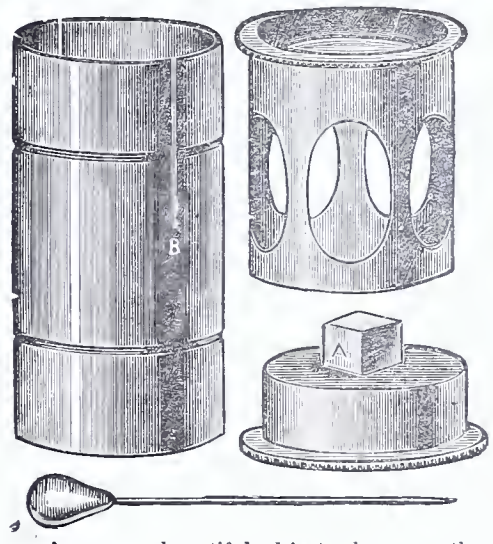
Price only $1.00 by Express; $1.15 by Mail.



The Dollar Typewriter is a complete machine as shown in cut. It has 46 characters of type the same as that used on a Remington. It is provided with numerous patented devices for inking the type, holding the paper, spacing and governing the impression and allignment. It will write a postal card, note or full letter sheet and is particularly well adapted to addressing envelopes. It is a practical illustration of what a rare combination of ingenuity, skill and capital may do as it embodies many difficult and expensive mechanical movements which were heretofore only possible in high price machines. Over a **QUARTER MILLION** of these machines have been sold within the last year and the secret of its great success is that the manufacturers commenced with a foundation of original ideas and then spared no expense in putting them to practice by the use of the best machinery to be devised. If no more could be said of it this Typewriter is worth many times its cost as an instructor of children teaching and amusing at the same time, but its features of practicability commend it to the use of nearly everyone and the sale it has had and will have is not surprising. It **IS A PERFECTLY CONSTRUCTED** machine that will do work equal in quality to any of the high priced machines. It is so **SIMPLE** that a **CHILD CAN OPERATE IT** and will not get out of order. It is **LIGHT** and **PORTABLE**—just the thing for travelers. It is very **ATTRACTIVE** in appearance, made entirely of metal, mounted on a highly polished hard wood base. It will **WRITE RAPIDLY** with practice—15 to 25 words a minute. We **GUARANTEE** every claim for it, and if not as represented **REFUND MONEY.** The **PRICE** is but **ONE DOLLAR!** This is the age of typewriters, and no one should be without one.

Any typewriting that may be done with any of the high priced machines, from $100.00 down may be done with this one. It is now possible for **EVERYONE** to own a Typewriter and address and write their letters, postals, etc., in the same way the richest firms do theirs. The monopoly in Typewriters died when **"THE DOLLAR"** was born. Postage 15c. **Price $1.00 Each.**

With "Inventive Age" one year, $1.75.



COMBINATION MICROSCOPE.

Scientific skill and the greatest perfection in workmanship coupled with a very high magnifying power, distinguish this handsome microscope over all others ever offered at popular prices. It is specially imported from France, and readily sells for one dollar at retail. As regards power and convenience of handling, good judges pronounce it the best ever introduced for popular use. The cylindrical case is manufactured from highly polished brass, while there are two separate lenses—one at each end of the microscope. The larger glass is a convex magnifier, adopted for examining insects of various kinds, the surface of the skin, the hair, fur or any small articles. It will magnify the hairs on the hands or arms till they resemble large ropes, and it is a most interesting companion. The other lens is exceedingly powerful, and will clearly delineate every small object, entirely invisible to the naked eye such as the animalcules in a drop of water, fishes, feathers and the minutest insects. An interesting illustration of its great power may be had by placing a drop of sour flour paste upon the bottom of the lens, when on looking through the eye-piece, the sight of the writhing mass of thousands of worms, snakes and eels, is one never to be forgotten. Thousands of living animalcules can be seen in a single drop of stagnant water. An insects eye is a very beautiful object when seen through this microscope. It reveals hundreds of small eyes or six sided facets resembling net work or honeycomb, which enables the insect to see in all directions without moving its head. There are 4,000 of these little eyes in the single eye of a fly. It is invaluable in detecting adulterations in food, such as flour, tea, coffee, sugar, spices, milk and the fatal trichina spiralis or pork worm. Postage 3c. **Price 47c. Each.**

With "Inventive Age" one year, $1.35.

$1,000 REWARD

To every inventor taking out a patent through our office. For particulars and a 79 page excellent hand-book for inventors, inclose stamps and address **The American Patent Market and Novelty Works**, ST. PAUL, MINN. Mention this paper. A. M. CARLSEN, Prop.

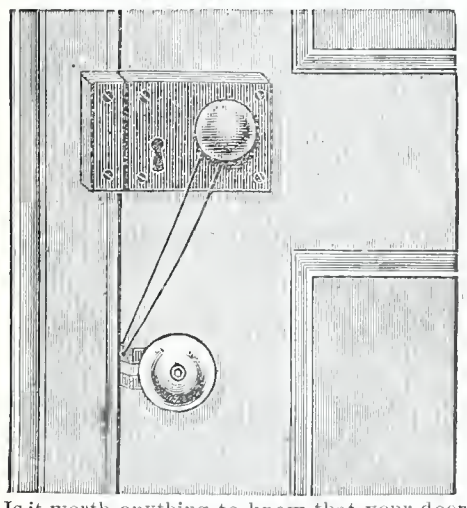
PATENTS.

For eleven years I have devoted my time exclusively to the preparation and prosecution of applications for PATENTS, TRADE-MARKS and COPYRIGHTS, to the management of interferences, to rendering opinions as to scope and validity of patents, to making preliminary searches, and to attending to all matters relating to patents or inventions. Highest references in all parts of the country. Send for hand-book on patents.

RHESA G. DuBOIS,

Inventive Age Building. WASHINGTON, D. C.

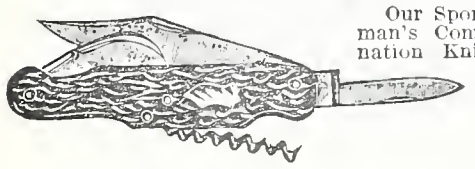
BURGLAR ALARM.



Is it worth anything to know that your door is closed against the smartest sneak thief every night? This Alarm will give you that feeling of security. He may pick or break the lock, but he don't open the door without setting off the Alarm. Its simplicity accounts for its low price and its value. It winds like an Alarm Clock and is closed into any doorjam without injury to woodwork. When the door opens it drops, suspended by string, and goes off with loud ring. Postage 5c. **Price 65c. Each. $7.20 Doz.**

With "Inventive Age" one year, $1.50.

SPORTSMAN'S KNIFE.

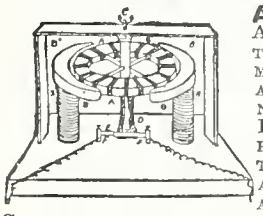


Our Sportsman's Combination Knife.

Genuine heavy stag handle with three blades, one large clip blade, one medium, one short and one curved, all in finest crocus polish, also has corkscrew, milled scales, brass lined, German Silver shield, one of the handsomest and most durable knife we have ever offered. Postage 5c. **Price 95c.**

With "Inventive Age" one year, $1.40.

ELECTRO MOTORS; HOW MADE AND HOW USED.



A HANDBOOK FOR AMATEURS AND PRACTICAL MEN BY S. R. BOTTONE. AUTHOR OF "THE DYNAMO," "ELECTRICAL INSTRUMENT MAKING FOR AMATEURS," "ELECTRIC BELLS," ETC., ETC. AND A. M. A. BEALE, AUTHOR OF BEALE'S CALISTHENICS, ETC.—A complete and simple explanation of the source of the power in a dynamo and the method of applying the same, commencing with a Simple Motor, and proceeding to an exposition of the Siemen's, Thompson's, Walker's, Grison and other motors.

In addition three special chapters by an American author follow in which the information embraces all American improvements. The work is probably the most complete and easily understood of any of the many now in the field.

180 PAGES, CLOTH, PRICE.....**75 cts.**

With "Inventive Age" one year, $1.50.

Just Published.

Standard Electrical Dictionary,

By Prof. T. O'CONOR SLOANE,

Author of "Arithmetic of Electricity," Electricity Simplified," Electric Toy Making," Etc.

624 Pages. 350 Illustrations. Handsomely Bound in Cloth, 8vo, Extra Super Calendered Paper, **$3.00.**

The large sales of the author's previous works, and the flattering reviews they have received from all sources, together with the great demand for a Dictionary of this kind, have led Prof. Sloane to complete, after a vast amount of labor, a work of a very high standard.

In publishing the "Standard Electrical Dictionary," we have adhered to what the work purports to be, exhausting the subject of electrical terms, giving each title the clearness of explanation necessary to make the understanding of it complete, without unnecessary elaboration. In this work, every electrical word, term, or phrase will be found intelligently defined.

The work is absolutely indispensable to all in any way interested in "Electric Science," from the higher electrical expert to the everyday electrical workman. In fact, it should be in the possession of all who desire to keep abreast with the progress of the greatest science of the times.

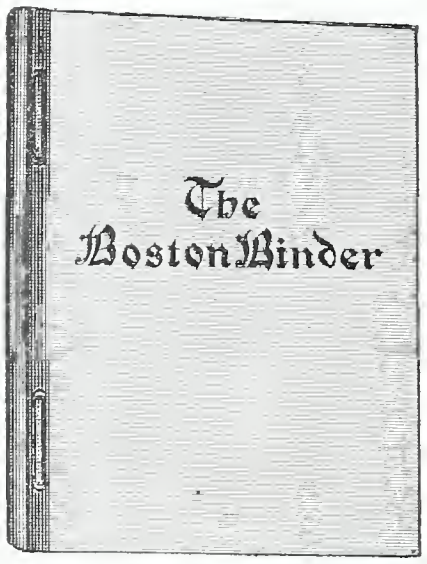
PREPAID TO ANY ADDRESS ON RECEIPT OF $3.00.

Address,

THE INVENTIVE AGE,
Washington, D. C.

Bind "The Inventive Age."

It is the best binder ever invented. It takes only half a minute to insert the paper, and thereafter it is kept clean, and can always be found when wanted. A single binder will hold an entire year's issues of the AGE. When it is complete it can be filed away in your library as a most valuable book of reference for the year 1895.



The Binder is very inexpensive. We send it postpaid on receipt of only **thirty cents,** cash or stamps. It makes all the difference between lost, torn, and dirtied papers, scattered about the house in such cofusion that you can never find what you require, and a handsome orderly file which becomes at the end of the year a volume for your library certainly worth from $1 to $3.

To insure a copy of the new Boston Binder to every one of our subscribers, we make the following liberal offer:

FIRST. On receipt of fifteen cents with your renewal to pay for postage, packing, etc., we will send the Boston Binder **free.**

SECOND. To any old subscriber who sends us **one new subscription,** we will send the Binder **free of charge.**

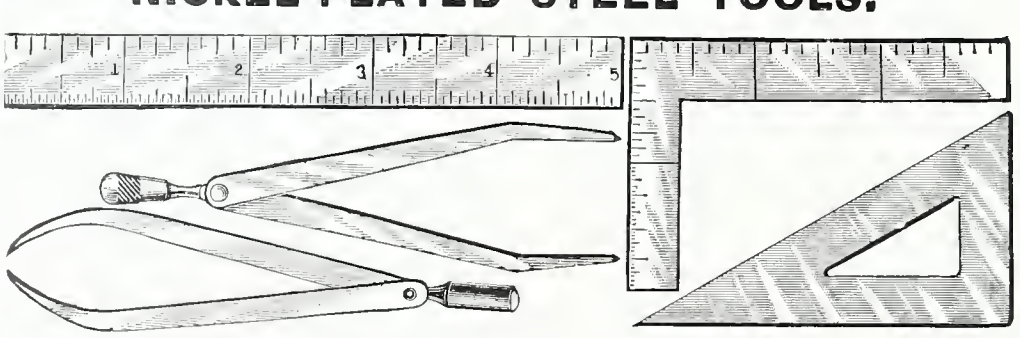
THIRD. Any old subscriber who renews his subscription and sends us **two new subscriptions,** we will send a Binder **free** to each party.

These are very generous offers, put we want every reader of the AGE to preserve his paper, and we are willing to contribute a little ourselves toward this end.

Send your orders in at once for the new Binder.

"INVENTIVE AGE," Washington, D. C.

NICKEL-PLATED STEEL TOOLS.



These articles are made of the finest steel, polished and plated in the best possible manner and are for all practical purposes equal to similar goods sold in stores at five times the price. The well known high prices of such goods, has induced us to manufacture them in large quantities and to furnish them at prices at which every one can afford to buy. They are useful in the household and indispensable in every office and store. In fact no one should be without them.

By mail, **15** cents each; **$1.20** per dozen. Set of 5, **60** cents.

With "Inventive Age" one year, $1.

The Norris Peters Company,

Photo=Lithographers,

458-460 Penn. Avenue, Washington, D. C.

Special attention given to the reproduction and printing of copies on parchment, drawing-paper, tracing-linen, and cardboard, of Patent Office drawings for attorneys to accompany application for patents in foreign countries.

THE AMERICAN PRESS CLIPPING CO.

District Title Building, Washington, D. C.

Please send till further orders, newspaper clippings about myself and on the following subjects:

.....

.....

For which I agree to pay monthly as follows: $1 a month for 25 (or less) clippings; 4 cts. each up to 200 in a month, and 3 cts. each for all over that number, a month.

Name .....

Address .....

C. J. STOCKMAN, Inventive Age B'ld'g, Washiugton, D. C.

F. E. WELCH. 20 Kimball House, Atlanta, Ga.

STOCKMAN & WELCH,

EXPERTS IN PATENTS,

All work attended to promptly and faithfully

Correspondence Solicited.

Our clients will have the privlege of placing a model of their inveniion on exhibition in our section in the Atlanta Exposition to be held in 1895, without cost to them.

Washington, D. C.

Atlanta, Ga.

PATENTS OBTAINED.

E. W. ANDERSON & CO.,

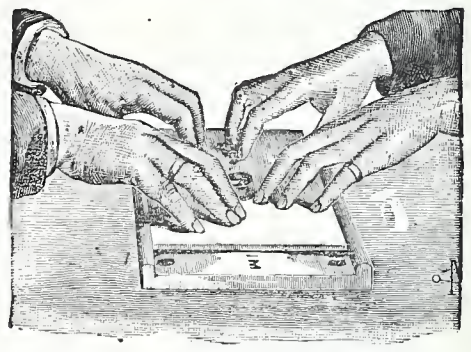
Counsellors at Law,

700 7th Street, WASHINGTON, D. C.

Examinations without charge.

Inventor's Guides free.

GENII OR TALKING BOARD.



This wonderful discovery, based on the mysterious powers of human magnetism, answers all questions on any subject, in the most accurate and marvellous manner. How and why it does this we cannot explain; yet when the Board is set between two persons, and their fingers are placed on the little magnetic table, set upon the Board, the little table will soon commence to move, faster and faster, talking or answering questions rapidly, by touching the printed words or letters on the Board. It works with surprising speed, and will answer every question on all topics—political, religious or social. It will tell your fortune, guide you in business matters, and inform you as to your future husband or wife; tell whether you are to be rich, live long, etc.

The GENII is a marvel, astonishing all who try it. It is a handsomely polished Board, covered with words and letters, and with the magnetic table, is packed in a strong box. Postage 25c.

Price 60c. Each; $6.00 Doz.

With "Inventive Age" one year, $1.75.

SPRING BALANCE SCALES

Spring Balance. An old favorite. Will weigh anything under 24 pounds. The best quality yet produced. Elegantly finished and accurately made and sealed off. Great value! Postage 6c.

Price 12c. Each; $1.28 Doz.

With "Inventive Age" one year, $1.

WM. DUFFY,

REGISTERED

Plumber and Gas Fitter,

1130 N. CAPITOL ST.,

WASHINGTON, D. C.

ESTIMATES FURNISHED

Orders by mail will receive prompt attention.

D. BALLAUF,

Practical Mechanician,

(Established 1855.)

Constructor of Light Machinery, Experimenta and Model Work.

All orders for Certified Duplicates of Patent Office Models, and Models of any Foreign Patents from Drawings and Specifications, filed in the Library of the Patent Office for law suits in case of infringement; also, Original Models for Inventors, and Models to complete application for Patents, from Drawings and Specifications filed in the Patent Office.

731 7th Street, N. W., WASHINGTON, D. C.

The Inventive Age
AND INDUSTRIAL REVIEW
A JOURNAL OF MANUFACTURING INDUSTRY AND SCIENTIFIC PROGRESS

Sixth Year. No. 10. | WASHINGTON, D. C., OCTOBER, 1895. | Single Copies 10 Cents. $1 Per Year.

Compressed Air Locomotives.

A recent issue of the Engineering Magazine contains a very interesting illustrated article on the widening use of compressed air and a recent catalogue issued by James Clayton, of New York, has revised and extended the article showing more specifically the various purposes for which compressed air is now being utilized. Until a few years ago the only general employment of compressed air was for sinking caissons, operating rock drills, coal cutters and other mining machinery; manipulating air brakes, and a few other minor uses. To-day it is claimed there are over 200 established applications of compressed air, exclusive of many patented processes in which it is employed and the field is constantly widening.

Compressed air utilized for power purposes, either locally or at a distance, has been known to the world for nearly two hundred years, some experiments with it have been conducted by Dr. Peppin, an eminent French engineer, in the early part of the eighteenth century. It has been more or less identified with almost every prominent engineering work in America in modern times, furnishing as it does a means of transmitting power a long distance from its source, without the heavy loss from condensation attendant upon the use of steam; or supplying the power for sinking a bridge caisson without interferring with the duties of the workmen inside; or permitting mines to be worked at levels where the use of steam would be impracticable, the exhaust air having a marked effect in reducing the temperature of the mine.

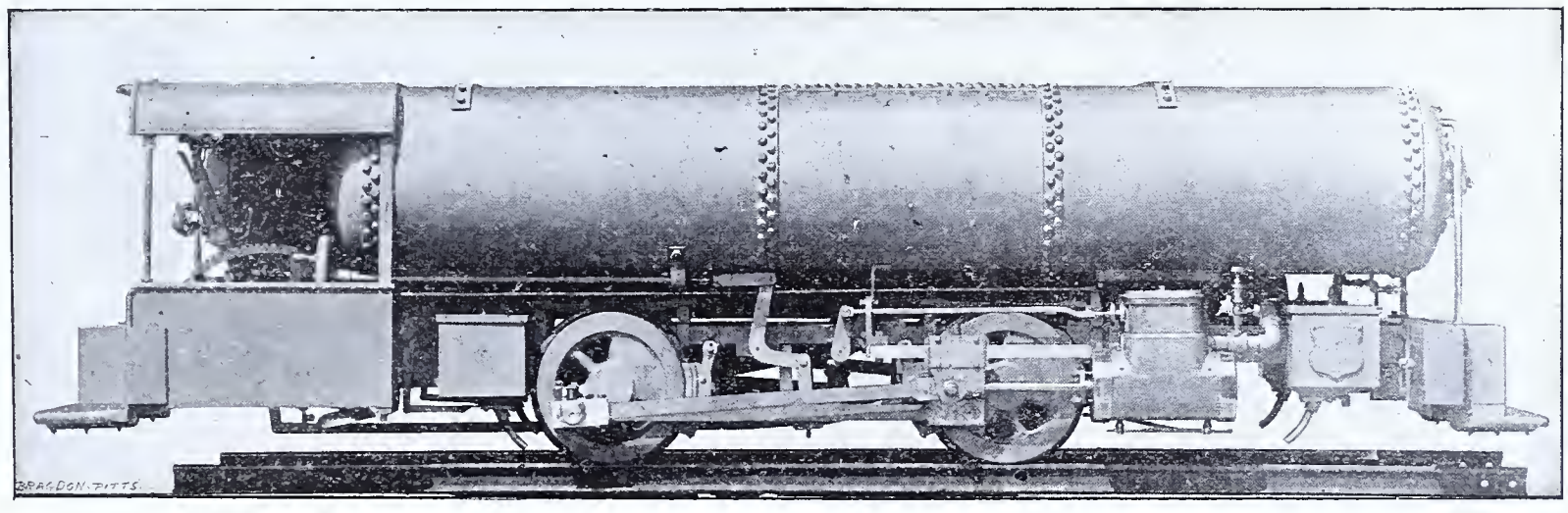
The method of raising water from deep wells by means of compressed air is one that has recently commanded attention, and many of our largest factories and mills have become dependent upon air compressors for their entire water supply. Among the advantages of this method is the entire absence of valves, plungers, rods and other mechanism, and the consequent ability of the system to raise mud, dirt or gravel as easily as clear water. The water delivered is naturally cooled and aerated by the presence of the air and the achievements of this method in forcing water from hitherto non-flowing wells gives it an incalculable value over other pumping systems.

The use of compressed air in pneumatic tubes has been generally observed, but as compared with foreign countries we are far behind in the practical utilization of pneumatic systems. One of the most extensive systems in this country is that installed in the Philadelphia postoffice. The distance from the main office to the sub-station at Chestnut street is 2,928 feet; hence the total length of tube (outgoing and incoming) is 5,856 feet. The tube is 6⅛ inches in diameter and the velocity of the carrier is 30 miles per hour. The air pressure at the main station is seven pounds and at the sub-station about four pounds. The carrier is received by an air cusion, the accumulated pressure automatically operating the receiving apparatus. The compressor used is a Clayton Duplex, supplying the entire system, the air returning to the main station practically reduced to atmospheric pressure. The carriers are made of steel, are 5¼ inches in diameter, 18 inches long, weigh 9½ pounds and are provided with buffers at the front end. Ths mouth of the carrier is closed by a lid, locked in a manner rendering it impossible for it to open while in the tube. The packings are of canvas and will last for about 550 miles of travel. The system carries about 30,000 letters per day at a cost of nine dollars and forty-six cents and put a small percentage of the capacity of the tube is used.

The propulsion of cars by compressed air is another source of utilization which has received the attention of engineers for some years past and but for the fact that this is a period of electrical development doubtless scores of street car systems would now be equipped with this power. A compressed air motor needs no conduits or overhead contrivances, does not emit smoke or hot gases and is almost noiseless. It is very light and can easily be handled on the steepest grades, is simple in form and does not frighten horses, the machinery in front being almost invisible from the outside of the car.

No injury to the health of workmen can result from the operation of pneumatic locomotives in passages difficult of ventilation, or in the intake air ways of mines. Renewal of the atmosphere, rather than vitiation, results from their use. Their presence entails no liability to explosions from the ignition of dangerous gases, such as have caused the loss of thousands of lives and the destruction of millions of dollars worth of property. These are considerations which cannot fail to recommend pneumatic power as a means of locomotion to the managers of mines.

The accompanying illustrations show the type of compressed air locomotives recently built by H. K. Porter & Co., of Pittsburg, for the Susquehanna Coal Company's No. 6 shaft at Glen Lyon, Pa. This locomotive is said to overcome the objections that are valid and substantial as against the use of steam or electricity in the way indicated. Its advantages over the latter, its more formidable competitor, are claimed to be, as follows: In the first place, no wires are required, and there are no obstructions overhead or underneath the entry, but the tunnel is left entirely free and clear. In the second place, the power is self-contained, and as long as there is a supply of air in the tanks the engine can move, and is not disabled by any breakage in connecting wires. Thirdly, the engine can be used at will in in any entry where a track has been laid, and is not dependent upon wire connection. Again, the only machinery required is the air compressor, with which almost all coal mines are provided. The operation of filling the tanks is extremely simple, and has to be repeated only at considerable intervals.



PORTER COMPRESSED AIR LOCOMOTIVE.

The design of the new motor appears to be mechanically excellent. It is simple in construction, with no complications of machinery, and could certainly be operated by any reasonably intelligent man. It should also possess great durability in

(*Continued on page 155.*)

The Inventive Age

Established 1889.

INVENTIVE AGE PUBLISHING CO.,

8th and H Sts., Washington, D. C.

ALEX. S. CAPEHART. MARSHALL H. JEWELL.

The INVENTIVE AGE is sent, postage prepaid, to any address in the United States, Canada or Mexico for $1 a year; to any other country, postage prepaid, $1.50.

Correspondence with inventors, mechanics, manufacturers, scientists and others is invited. The columns of this journal are open for the discussion of such subjects as are of general interest to its readers.

Technical matter is particularly desired. We want practical information from practical men.

Nothing will be published in the editorial columns for pay.

The INVENTIVE AGE is thoroughly independent.

Advertising rates made known on application. Special facilities for furnishing cuts of any patented article together with descriptive article. Business specials 25 cents a line each insertion, 7 words to the line. No advertisement less than 50 cents.

Address all communications to THE INVENTIVE AGE, Washington, D. C.

Entered at the Postoffice in Washington as second-class matter.

WASHINGTON, D. C., OCTOBER, 1895.

A CAREFUL poll of the new Congress reveals the fact that the House is overwhelmingly opposed to free coinage and in the Senate the advocates of the white metal are also in the minority.

THE successful horseless carriage thus far is not the one propelled by the use of electric power. The gas engine both abroad and in this country has given the best results.

THE INVENTIVE AGE calls particular attention to the fact that its Patent Bureau is the special correspondent in the United States for Messrs. Cantwell & Co., leading patent agents in Calcutta, and G. G. Turri & Co., the most extensive patent firm in Melbourne, Australia.

STILL the Niagara-Buffalo deadlock continues and the energetic city on Lake Erie fails to realize the fulfillment of fond hopes in relation to cheap and abundant electric power. The trouble is between the aldermen of Buffalo and the Power Company as to franchise and restrictions.

SECRETARY CARLISLE'S definite statement that there will be no further bond issue is taken as an indication that the favored syndicate of New York bankers who made $10,000,000 or such a matter out of the last issue intend to maintain the gold reserve in the national treasury even beyond the period agreed upon when the last bond issue was made.

IN another column of this issue is published an exhaustive article regarding recent changes in the patent laws of India. Many enquiries have been made regarding the provisions of the laws of this great country which, in its rapid development, is offering an excellent field for the inventor. As will be seen it is proposed to remedy the defects in the old law by radical changes, all of which will not only interest inventors but patent agents as well throughout the United States.

AND now it is given out that the World's Fair diplomas will not be ready for delivery until about next February. As souvenirs for the grandchildren of exhibitors these medals and diplomas will not be so bad after all. It should be understood that the bureau of engraving and printing has had this diploma business in hand. If the contract had been let to a private individual, of which there was some talk at one time, the awarding of the diplomas might have been made while the original exhibitors yet lived.

ON the 11th ult. a special train on the New York Central railroad, consisting of four heavy coaches, beat all previous records of speed on railways both in this country and in Europe. It made therun from New York to East Buffalo, a distance of 436½ miles, in 407 miuutes, or an average speed of 63.282 miles an hour. The combined weight of the four cars was 358,310 pounds, much heavier than trains on English and Scotch railways that have heretofore held the pennant for speed. The regular Empire State express makes the daily run from New York to Buffalo, 440 miles, in 520 minutes. On the 23d ult. another record was made by the New York Central —Albany to Syracuse, 149 miles in 135 minutes.

WE desire to call the attention of our readers and their friends among inventors to our Patent Bureau, through which medium inventors are guaranteed prompt and efficient service. An investigation of the Patent Office records and of court decisions reveals the fact that a large percentage of the patents granted are absolutely worthless. Thousands of inventors have received patents in name only. When they have undertaken to develop or sell their inventions they have found them invalid or so incomplete as to be of no protection against infringers. The greatest care and skill is exercised by our patent experts in the preparation of specifications and claims for inventors and in prosecuting all business confined to us before the Patent Office.

MR. W. H. KNIGHT, engineer in the railway department of the General Electric Company takes occasion, through the columns of Electrical Engineer, to deny the story started by Mr. S. B. Caswell, of Indianoplis, that the new Baltimore & Ohio electric locomotives were not a suceess. Mr. Knight says that since formally starting to operate, about a month ago in the Baltimore tunnel, the locomotives has been in continuons service and has given splendid satisfaction. He declares that the overhead trolley system has been peculiarly successful. The trolley carries as high as 4,000 amperes and has been run at a speed of 60 miles an hour. Trains weighing 1,400 tons have been handled up an 8 per cent grade with perfect ease. To criticise anything with which the General Electric Company has to do seems to be quite a fad in some directions, but in the meantime electrical science advances and the General Electric keeps in the van.

THE INVENTIVE AGE is in receipt of a letter from Mr. M. K. Jeffries, of Hillsboro, Wis., in which grievances quite serious and voluminous are recited against patent selling agencies. He paid out a great deal of money in "advance fees" on representations of prospective riches in store for the enterprising inventor who confided in the so-called promotor and patent seller. THE INVENTIVE AGE has taken occasion in many instances to warn its readers against patent sharks. Such a large percentage of so-called patent selling agents are frauds the wise inventor will make no mistake if he hesitates and makes extensive enquiries before he parts with his money for "advance fees." He should satisfy himself of the truthfulness of the representations made; he should insist upon names and dates of parties to whom and for whom and when patents have been sold. Circular representations of "large number of sales made during the past month," should be viewed with suspicion and if the patent seller objects to the pertinence of the inventor who wants further information regarding "recent" sales he may be set down as a fraud.

THE rapid advance in prices of steel and iron and the remarkable increase in the volume of business since March has caused much speculation in business circles and not a little apprehension of coming reaction. Bradstreet's publishes an exhaustive review of the iron and steel trade and says: "Taking into consideration the large advance in values and the great increase in the volume of business, the present revival of the iron trade is probably of greater proportions than any similiar movement in the history of the American iron and steel industry." The price of Bessemer pig iron and billets has increased nearly 65 per cent since the beginning of the year. One of the interesting features of revival in the iron trade during the past six months is the fact that while there has been such a marked advance in the price of crude and finished products, there has been no corresponding increase in the cost of the raw materials. Practically all of the iron ore required for this year was bought by the pig iron manufacturers last spring at prices but little above the abnormally low figures of last year, and while the furnace operators have profited largely by the advance in the price of pig iron, the mine owners have been shut out from all the benefits of higher prices by contracts made last spring and running through the year. While Bessemer pig iron has advanced about $6 per ton from the lowest point, the increase in the cost of its manufacture by reason of the slight advance in the price of ore, the increase of 45c. per ton in the cost of coke, and an increase of about 10 per cent. in labor, has probably not exceeded $1.50 or $2 per ton at the outside, while in many cases the increase in cost has been much less than this. The advance in prices to the present level is almost wholly the result of the larger demand rather than the effect of increased cost of production. What promises most for a continuance of the present activity is the wide diversity of the demand for all forms of iron and steel. While the railroads and allied interests are probably the most important consumers of iron and steel, the revival in the trade began with little or no help from these factors. The railroads have since given powerful stimulus to the iron trade and are likely to figure even more largely among the buyers; but it is nevertheless true and a gratifying fact that the support of the iron and steel industries now comes from many and varied sources. Obviously this contributes largely to the stability of the trade."

Largest Fire Engine in the World.

In a recent issue of the INVENTIVE AGE, a fire engine in Hartford, Conn., was spoken of as the largest in the world. To this Messrs. Merryweather and Sons, London, take exceptions. They say "Our firm has built two "Greenwich" steam portable fire-engines, which are in regular use by the Liverpool Corporations, one capable of throwing 1,400, and the other 1,800 to 2,000 gallons of water per minute. The Hartford engine weighs some 9 tons, and only throws 1,300 gallons per minute, whereas the Liverpool "Holt" weighs only some 3½ tons, and ean pump 700 gallons per minute more. The speed also of 32 miles per hour, mentioned in the American accounts, turns out to be an impossiblity for a machine travelling on a public road, as it would overturn at the first corner the driver tried to negotiate. The "Holt" can be easily drawn at full gallop by 4 horses, and will dischage a single jet over 200ft. high, or as many as twelve jets simultaneously, and has done good work in actual fire service."

Important New Patent Office Rule.

Heretofore inventions have been accustomed to make use of the two years, time in which to prosecute an applicaton before a Primary Examiner in the Patent Office. The new rule allows only six months and went into effect April 15, 1895. Pending cases will be affected as though the last office decision were upon that date; therefore, all applieations which were pending before that date should be amended or argued before October 15, 1895.

This is the essential feature of the rule and important at this time, because of the near approach of the limiting date, and the undersigned takes this opportunity of informing probably hundreds of inventors who may be depending upon the two year's limit. EDWARD P. THOMPSON.

A Half Million for Ten Minutes.

Half a million dollars is what the Great Western railway has just had to pay to free itself from the obligation to stop every train at Swindon Station for ten minutes. In 1841, before the road had reached Bristol, it made an agreement for ninety-nine years with a firm of builders to hold every train carrying passengers, "not being sent express or for special purposes, for a reasonable period of about ten minutes," at Swindon in consideration of the erection of suitable refreshment rooms, for which a rent of a penny a year was to be paid. The railroad soon found out the inconvenience of the arrangement and tried to break it. The courts in 1846 and 1872 held that "express" did not mean in the contract what is now meant by an express train; but the price asked for the annulment of the concession was always more than the company was willing to pay. After a fight of over fifty years it has been driven by the competition of other roads to buy out its opponents, and the ten-minute stop of fast expresses at Swindon is now a thing of the past.

NOTES.

New Torpedo Boat Destroyer.—The trial trip of the torpedo boat destroyer Salmon was lately run. This vessel has been built and engined by Earle's Shipbuilding and Engineering Company, of Hull, and is one of the larger class of the destroyers, her displacement being 280 tons. Her draught, on trial, was 5 feet forward and 7 feet 3 inches aft. The mean speed on the six runs on the mile was 27.88 knots, and for the whole three hours 27.608 knots, or at the rate of 31¾ miles per hour. The Snapper is a sister vessel, built by the Earle Shipbuilding Company for the Admiralty. The contract price for each vessel is $176,960, exclusive of armament.

* * *

An Earthquake on the Atlantic Coast.—A shock of earthquake was felt a few minutes after 6 o'clock on the morning of Sunday, September 1, along the Atlantic coast from Delaware to Long Island. The shock in New York City was very slight, but was sharp in New Jersey and to the east of New York. The vibration was attended by a slight rumbling noise. This makes the fourth shock which has been felt in New York City in the last eleven years. On August 10, 1884, at 2.14 p. m., there were three distinct vibrations, the second being the severest ever recorded in this vicinity. Other slight shocks were felt on August 31, 1886, and on March 8, 1893.—*Scientific American.*

* * *

The Alum Industry.—The manufacture of alum and sulphate of alumina, those common and comparatively cheap chemical products, is a very important industry. It amounted in 1894 in the United States to no less than 72,000 tons, and in 1893 to 96,000 tons, having an average value of 1½ cents a pound, or a total value at the works of $2,160,000 in 1994 and $2,880,000 in 1893, and yet this great industry has heretofore been shrouded in comparative mystery. In the United States it is controlled by a small number of manufacturers who are extremely unwilling to give any information concerning the methods of manufacture adopted, the cost of production, or other matters that would have great interest to many readers.

* * *

Electric Eccentricity.—The Boston Journal of Commerce says that North Adams continues to be puzzled over a queer crankism of electricity in its vicinity. Although when the great 4½ mile Hoosac Tunnel was built no ores, magnetic or otherwise, were encountered, there was general expectation that rich ore pockets would be found; yet, for an unexplained reason, not an electrician has been discovered who can send a telegraphic message on a wire running from portal to portal of that tunnel, be such wire run inside of an ocean cable through the hugh cavern or out of it. Therefore such messages have to be sent on wires strung on poles over the top of the mountain, fully nine miles, and that is the way in-going and out-going passenger and freight trains are heralded to the keepers of the two tunnel approaches.

* * *

History of the Telephone.—The Patent Office library contains an interesting volume on the history of the telephone, written by an English professor, who has made an exhaustive study of the original invention of Philip Reis, a German scientist, who as early as the sixties exhibited before scientific associations his invention of communicating sounds to a distance by practically the same means now employed in the great telephone systems of the world. The author of the book unhesitatingly credits Reis with the invention of the telephone and on Reis' monument in the cemetery where he lies buried in Germany he is referred to as the inventor. The book is profusely illustrated with engravings of the mechanism employed by Ries during the progressive stages of his invention. The original microphone was fashioned in imitation of the human ear, but from this model Ries gradually worked up to a device resembling the present system. For many years he was laughed at for his pains in trying to give the world a great invention, and a thousand discouragements beset his path, but the results achieved by him at the time of his death plainly indicate that he was on the right road and within a hair's breadth of the true principle. Years before the telephone was known outside of scientific circles, the mechanical papers of his native country gave minute descriptions of Ries' work with illustrations, which are made part of the proof advanced by the author of the book who attempts to place the credit where it belongs,—*Washington Post.*

Birmingham turns out every meek, among other articles, 14,000,000 pens, 6,000 bedsteads, 70,000 guns, 30,000,000 cut nails, 100,000,000 buttons, 1,000 saddles, 5,000,000 copper or bronze coins and 20,000 pairs of spectacles.

The Car Building Industry.

In a recent issue of "The Engineering Magazine," some very interesting figures are given by John C. Wait respecting the growth and importance of the car building industry in the United States. The magnitude of the interests involved, in investment of capital, the use of material and the number of men employed, is simply enormous. It is placed by the writer named as a "sixth among the mechanical and manufacturing industries in the number of employes, and eleventh in the capital interested, and tenth in value of products." In comparison with the tonnage of all the transatlantic steamships combined it is stated that in the year 1893, while the total tonnage of these ships was 2,250,000 tons, that the 1,340,000 freight cars of the United States and Canada was ten times more than that amount. "In 1890 there were seventy-one car building companies engaged in making steam cars, not including railway shops. These companies had a total capital of $43,641,210; the number of men employed was 32,062 and the wages paid $16,836,551. The cost of materials used was $44,674,486." As illustrating the magnitude of this and its related and dependent industries the writer says: "In January, 1895, the aggregate number of cars in service in the United States and Canada was about 1,406,321, of which 1,208,770 were included in equipment of railway companies, 164,987 were in the service of transportation companies; and 32,564 belonged to private companies or individuals. This equipment represents an investment of not less than $750,000,000, and requires for repairs and renewals a sum approximating $70,000,000 per annum. The renewals alone require the annual production of about 1,500,000 wheels, 175,000 axles, and of course an immense number of journal bearings, springs, bolts and iron parts worn out or broken. Rebuilding and repairing requires 100,000 men, who receive $1,500,000 per year, and, though generally classed as car repairers, may be considered as belonging to the car-building industry." From these quotations it can be readily seen that the steam car building industry of the United States is one of leading importance in our national industries.

Inventor of the Circular Saw.

Credit for the invention of the circular saw seems to be conclusively settled, in the opinion of the "Iron Industry Gazette." Noting the claims for this credit, Mr. C. A. Dunham writes as follows: Allow me to say that the circular saw was invented in America about the year 1770 by a comb maker by the name of Hartshorn, who used a common handsaw to saw out the horn between the teeth, thus forming one of those old-fashioned horn combs. Finally, thinking it a rather slow process, he took what used to be called a "Bungtown copper," filed it down thinner, drilled a hole through its center, then squared the hole and cut the teeth in its outer edge; placing it upon a mandrel true and permanent and then putting it into his lathe, with the flat horn lying upon a wooden rest, he sawed out his combs. From the copper he shortly cut up his handsaw and converted it into circular saws. This man Hartshorn lived and died in Mansfield, Conn. I have been well aquainted with his descendants. He also invented the screw and lip auger, also the bit, such as are used in the brace. He was asked why he did not put in his claim for compensation, long afterward, when we had a patent office. His reply was that if he had done anything that was a benefit to his fellow men they were welcome to it."

Apples as Medicine.

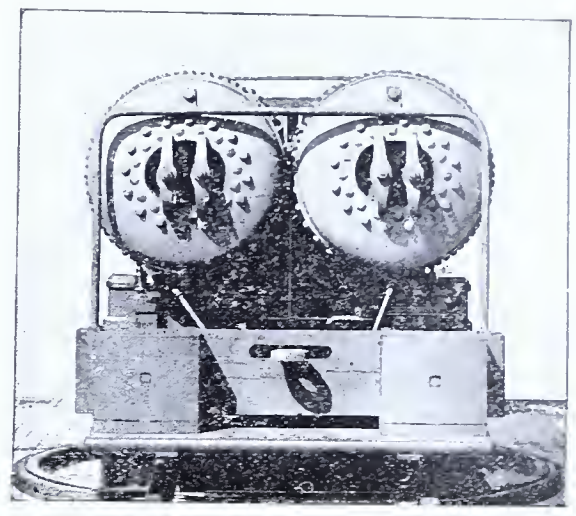
According to D. G. R. Searles, the apple is medicinal in a marked degree. He says: "The apple is such common fruit that very few persons are familiar with its remarkably efficacious medicinal properties. Everybody ought to know that the very best thing they can do is to eat apples just before retiring for the night. Persons uninitiated in the mysteries of the fruit are liable to throw up their hands in horror at the visions of dyspepsia which such a suggestion may summon up, but no harm can come to even a delicate system by the eating of ripe and juicy apples just before going to bed. The apple is an excellent brain food, because it has more phosphoric acid in easily digestible shape than any other vegetable known. It excites the action of the liver, promotes sound and healthy sleep, and thoroughly disinfects the mouth. This is not all. The apple agglutinates the surplus acids of the stomach, helps the kidney secretions and prevents calculus growths, while it obviates indigestion, and is one of the best preventives known of diseases of the throat. Everybody should be familiar with such knowledge. In addition, next to the orange and the lemon, it is the best antidote for the thirst and craving of the person addicted to the alcohol or the opium habit."

Compressed Air Locomotives.

Continued from first page.

practice, the only part subject to wear being the running gear and the valve motion, and these have been carefully proportioned to stand long wear. Engines of this class have so far given satisfaction wherever they have been used.

The main feature of the engine is found in the air tanks or receivers which take the place of the boiler in an ordinary steam locomotive. In this engine the two air tanks are each 29½ inches in diameter, and have an interior capacity of 130 cubic feet. They are cylindrical in form with convex heads, the front head being provided with a manhole. The horizontal seams are treble butt-riveted and the heads are double riveted. Each reservoir is tested

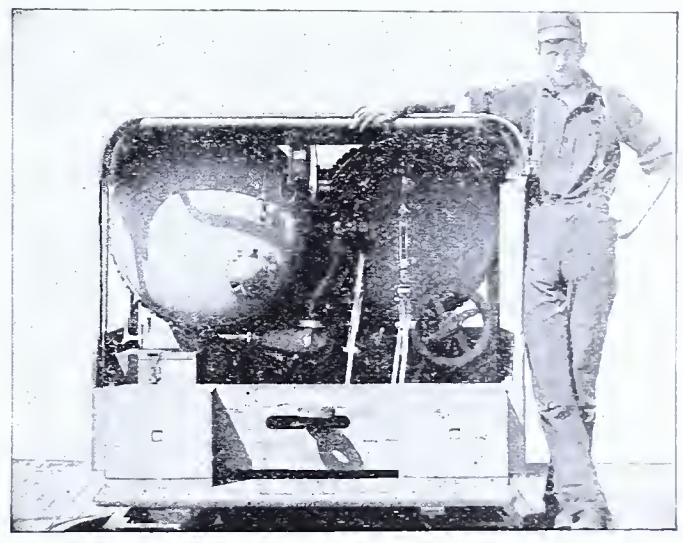


FRONT VIEW.

to carry a regular pressure of 600 pounds to the square inch. The tanks are provided with reducing valves, and there is an auxiliary reservoir from which air is supplied to the cylinders at a pressure of from 100 pounds to 140 pounds as may be desired. The pressure is changeable at will by means of valves.

From this auxiliary reservoir the air passes into the cylinders, which are 7 inches in diameter and 14 inch stroke. The engine is carried on four wheels or drivers. These wheels are 24 inches in diameter and are provided with steel tires. The crossheads, guides, connecting rods, and crank-pins are all made of steel, as are also the axles. The valves are acuated by an ordinary link pin motion and the links are of steel. We may add that the tanks are also of steel plate.

In designing the engine throughout convenience and efficiency of operation have been kept in view. All the levers, gauges, etc., are placed in easy reach



REAR VIEW.

of the engineer and can be controlled by him without moving from his seat. Great care was taken with the workmanship and material, which are always made by this firm to conform to the severe standards of the Pennsylvania Railroad Company. The engine has also been planned and arranged to work under the hard conditions necessary in a mine tunnel—moisture, rough track and similar drawbacks and to stand long hours of work with the shortest possible intervals of rest for oiling, cleaning, etc. The engine is fitted with a powerful screw brake, acting upon all the four driving wheels.

The guage of the mine track in this instance is 36 inches; the length of the engine over all is 17 feet 6¾ inches, its extreme width is 62 inches, and its extreme height above the rail 60 inches. The total weight ready for service is 18,500 pounds.

What is without doubt the smallest clock in the world was lately on exhibition in the show window of a Goettinger jeweler. The dial measures less than one-third of an inch in diameter, and the weight which furnishes the motive power is suspended from a human hair.

India Makes a Step in the Right Direction.

Messrs. Cantwell & Co., the long established and well-known firm of patent agents of Calcutta, India, through their representative, Mr. H. Cantwell, at present in Washington, have forwarded us a lengthy communication embodying the workings of the Indian Patent Office for the past year of 1894, of which we give a full synopsis herewith.

It will be noticed that the official report contains many points of considerable interest to patent solicitors in general in this country, discussing as it does several new and advantageous features to be adopted based in a great measure on the procedure prevailing at present in the British office.

We would call especial attention to the proposed new rules, which it will be observed, afford a larger latitude and greater scope than those heretofore in practice—the general inclination tending towards a much closer connection practically with the home office—a circumstance which argues extremely well for inventors in foreign countries who desire to protect their inventions in India, and which should ordinarily result in a far greater increase (than hitherto) in the number of patent applications filed annually in that country.

Of late, owing to the increased import of American made goods, such as canned fruits and meats, sewing machines, typewriters, phonographs, etc., the extreme advisability of the registration of the trade-marks identified with these products is urgently advocated.

Article 1506, M. W., offers special encouragement to would-be inventors at home and abroad with regard to the purchase and subsequent working and manufacture by the Indian government of inventions of a military or marine character. Such as, for instance, firearms, transport and baggage carts, military accoutrements and appliances, tents, saddlery, improved horse tethering devices, aluminum or other durable metal buckets, soldiers' water bottles, etc.

In the marine department, inventions both new, useful and readily applicable are always welcome. Such, for instance, as improved mariner's compass, charts, hoisting and winding apparatus, improved sounding and steering contrivances, fog signals, river buoys, life saving devices, machinery, electric light plant, signalling and search light equipment, etc.

A large field offers itself for inventors of textile machinery, paper and soap manufacturing machinery, cotton ginning and grain hulling machinery, electric and steam labor saving devices, as a very large industry has, of late years, sprung up in all these branches in India, more especially in the Western Presidency and Oudh, which bids fair to be the Lancashire of the East, cotton, jute, silk and textile fabrics commanding a large export.

From statistics compiled by Messrs. Cantwell & Co. and dating through the past six years, it was found that of the total number of applications for patents (both local and from abroad) filed annually in the Indian Patent Office, the United States of America maintained a creditable average of 31¼ per cent for that period or nearly one-thirds of the whole.

WORKINGS OF THE INDIAN PATENT OFFICE.

In the supplement to the Gazette of India, dated May 18, 1895, is published a lengthy report from Mr. G. W. Forrest, Secretary under the Inventions and Designs Act of 1888, showing the workings of the office during the year ending December 31, 1894. The Secretary spent several months in England and speaks of many visits to the Patent Office in London for the purpose of gathering knowledge which would be useful in the organization and administration of the Patent Office in India. He says:

"I had an instructive discussion with some of the high officials connected with the office in regard to the fundamental question whether it is better to adopt the English system of entering into no enquiry as to novelty, or the American system of having a thorough investigation made. In India the act leaves it discretionary to make an enquiry into novelty, but owing to there being but few competent experts in the country the exercise of this power must be more or less unsatisfactory. In England the concensus of opinion seems to be that it is better to make no enquiry into novelty. The advantages of the various publications issued by the Patent Office were discussed, and the forms in use and the rules in force were explained. Since my return to India the Patent Office in England has kindly forwarded to me a complete set of the various publications issued by it and copies of its several rules and forms. Some of these might, with advantage, be adapted to India. The time has certainly come when, as in the case in England, a set of rules might be prescribed under the act for the guidance of the public. At present the only guide is notifications issued from time to time in the Government Gazette. The framing of a set of rules for the guidance of the office has for some time been under consideration, and therefore the present appears to be an opportune time for considering the construction of rules for the guidance of the public."

The Secretary next recommends the publication by the government of an illustrated journal on the order of the English and American Patent Office Gazettes, and argues that the growing prosperity of the Indian office will justify a small expenditure on a work so useful to the public. Attention is called to the fact that the year was marked by a steady improvement in the several branches of the business done in the office. Among the matters of public interest dealt with during the year, says the Secretary, was a representation from the Society of Patent Agents, London, for the grant of a more formal certificate than that hitherto issued, of the filing of specifications and the acquisition of exclusive privileges. Steps have also been taken for the issue of rules for the preparation of drawings accompanying applications and specifications in order to secure uniformity in size and other details. Continuing the Secretary says:

"Three applications have been filed during the year under report for the extension of the term of exclusive privilege. One of these was granted for a further period of fourteen years, another was rejected as having been submitted after the prescribed time, and the third has since the close of the year been rejected. The total numer of applications for leave to file specifications was the same as last year, viz: 375; 266 of these were granted, 37 refused, and 72 remained pending at the close of the year.

"The number of references to experts was less than the previous year, and amounted to about a third of the number of applications filed. This decrease is due to the present policy of curtailing, as far as possible, the preliminary investigation regarding novelty and utility. The question of novelty and utility is now closely investigated in those cases only in which the invention is likely to affect the interests of the state, or that of the poorer classes who cannot protect themselves. Of the 131 applications referred to experts, 55 were on payment of fees and 76 without—21 of the latter, against 31 in 1893 having been reported on by the Public Works Department. One hundred and seventy-five of the applications filed were received from residents in India, 32, or 10 more than the previous year, having come from natives. Seven of the latter were refused for want of novelty in the inventions it was sought to have protected.

"The number of specifications filed during the year was 294 against 253 in the year before. These included 26 for matters connected with railways, 10 for the pulling of punkahs (fans), 10 for the manufacture of tea, 8 for the treatment of cotton and other fibres, 6 for water lifts, 4 for the manufacture of indigo, 4 for sugarcane mills and 3 for baling presses. The applications received for the registration of designs were only 38 in number, of which but 9 were registered. This was due to the subject of the applications being in some instance inventions, and in others trade-marks. In 14 cases the applications were for the registration of representations of the Hindu gods and goddesses on playing cards, which, however, was not considered as new and original designs within the meaning of the act.

"The Advocate-General was consulted in four cases involving points of law. In 133 cases the exclusive privilege acquired was continued—64 beyond the fourth year, 53 beyond the fifth year and 16 beyond the sixth year; this being an increase by 54 over the year previous. During the year under report 128 patents lapsed through the non-payment of the fourth year's renewal fee, and 20 through the non-payment of the fee for the fifth year. A marked increase in the receipt of fees received is also noticed."

THE PROPOSED RULES.

Under date of Calcutta, May 28th, the Department of Revenue and Agriculture sent out the following draft of proposed rules for the preparation of applications and specifications filed under sections 5, 8, and 51 of Act 5 of 1888, and of drawings attached thereto for general information and notice given that the draft would be taken into consideration by the Governor-General in council after the expiration of two months from that date:

1. All words used in these rules and defined in the said act shall have the meanings thereby assigned to them respectively.

2. Applications and specifications must be neatly and legibly written upon stout paper of half foolscap size—that is, of a size of 13 inches in height by 8 inches in width, and the pages numbering consecutively in the right hand top corner.

3. Drawings must be on either stout paper or tracing cloth, and must be neat and clear.

4. The left hand portion of each sheet of drawings to the width of a half sheet of foolscap—that is, a width of 8 inches, must be left blank, so that when the sheets are opened out, the sheets which lie above them and contain the text of the application or specification will conceal no portion of the drawings.

5 Each sheet of drawings must be of a width not greater than that of a sheet of foolscap—that is, a width of 16 inches, except when the size of any single drawing is such that a greater width is required for it; of the same height as a sheet of foolscap—that is, a height of 13 inches, except when the size of any single drawing is such that notwithstanding increased width a greater height is unavoidably necessary.

6. A clear margin of half an inch must be left round the portion of the sheet which is occupied by drawings.

7. Reference figures and letters must be clear and bold, and the same letters should be used for the same parts in different views or drawings. In complicated drawings, or when there is not room to write the letters in their proper places, the letters should be shown outside the figure and connected with the parts referred to by fine lines.

8. The name of the applicant, and the year in which the application is made or specification filed, should be shown on each sheet of drawings in the right hand top corner of the blank space left under rule 4. The sheets, when more than one, should be numbered consecutively, and the number of each should be shown in the right hand top corner of the sheet.

9. No written description of the invention or design should appear on the sheet of drawings.

10. When a patent has been applied for or obtained in England, a facsimile of the drawings submitted with the English application may be filed, without reference to the above rules.

11. Notwithstanding its non-compliance with any of the above rules, the Governor-General in council may in his his discretion permit any application or specification to be received and filed without requiring the same to be amended.

CIRCULAR FROM MILITARY DEPARTMENT.

Under date of June 14th the following circular memorandum was sent out from the Military Department, Government of India:

No. 1506-M. W.—The first clause of Section 17 of the Inventions and Designs Act (Act No. V of 1888) prescribes that, subject to certain conditions: "An exclusive privilege acquired under this part shall have to all intents the like effect as against Her Majesty as it has against a subject." And the second clause of the same section reads as follows: "But the officers or authorities administering any department of the service of Her Majesty may, by themselves, their agents, contractors or others, at any time after the delivery or receipt of the application for leave to file the specifications of an invention, use the invention for the service of the government on terms to be before or after the use thereof agreed on, with the approval of the Governor-General in council, between those officers or authorities and the inventor, or, in default of such agreement, on such terms as may be settled by the Governor-General in council."

The government of India have decided that inventions by private individuals, which may be tried for the use of the military and marine services, shall in future, be dealt with under the following rules:

1. Persons who desire to submit any invention for the military or marine services for consideration, should do so by letter addressed to the Deputy Secretary to the Government of India in the Military Department. The letter should state the nature of the invention, and whether an exclusive privilege has been acquired, and if so, it should quote the number and date of the specification filed. It should also state whether the person who offers it for consideration desires to make any claim for remuneration in connection with it. In the absence of such a statement, it will be assumed that no such remuneration is expected.

2. Expenses or loss of time incurred before or after the submission of an invention will give no claim unless authority for such expenses has been previously given by letter signed by one of the Deputy or Assistant Secretaries to the Government of India in the Military Department, and the liability will be strictly confined to the limits of expenditure authorized in such letter.

3. No claim for reward for an invention will be considered, unless the invention has been adopted into the service.

4. All claims for remuneration will be carefully considered; but any award which may be made will only be payable to the claimant when approved by the Governor-General in council.

2. The foregoing rules do not apply to inventions

by government employes under the Military Department, with regard to whom special regulations are in force.

E. H. H. COLLEN,
Secretary to the Government of India.

Extract from the proceedings of the government of India, in the Military Department, No. 3072-B, under date Simla, the 3rd of November, 1894:

READ—The Inventors and Designs Act, 1888, No. V of 1888, with special reference to Sections 16 and 17 thereof.

RESOLUTION.—All officers or subordinates holding staff appointments, or employed in any administrative, instructional, manufacturing, or experimental department under the Military Department of the Government of India are to understand that one of the conditions subject to which they hold such appointment or employment, is that they shall not acquire an exclusive privilege for an invention, or apply for leave to file a specification thereof, without first obtaining the approval of the Governor-General in council, by application through their respective commanding officers or heads of their departments.

2. Each application for such approval must contain a general description of the invention for which protection is desired.

3. Permission to acquire an exclusive privilege will not be granted as a matter of course, but each application will be dealt with according to the circumstances of the case. Should permission be granted it will be subject to the following conditions, from which there will be no appeal by the applicant.

(*a*) That if there be at any time desired by the Governor-General in council, the exclusive privilege shall be absolutely assigned to him, upon such terms as, after full consideration of all the circumstances of the case, His Excellency may decide.

(*b*) That the invention may be used by or for Her Majesty's service, and that the terms of payment, if any, for such use, shall be decided by the Governor-General in council.

(*c*) In settling terms, either for assignment or use, regard will be had by the Governor-General in council to any facilities in originating, working out and perfecting the invention which the inventor may have enjoyed by reason of his official position. All payments require the sanction of the Governor-General in council.

Messrs. Cantwell & Co., have in press a revised improved edition of their circular which deals extensively and in a very comprehensive and exhaustive manner with the taking out of patents and the registering of trade-marks in India, Japan and other Eastern countries. Inquiries relative to the Indian patent system and any information desired in regard to patents and trade-marks in that country can be directed to Mr. H. Cantwell, care of INVENTIVE AGE, Washington, D. C.

Sealing Liquor Bottles Electrically.

In a recent number of *La Nature*, Mr. A. M. Villon describes a novel method of sealing champagne bottles. The loss and deterioration of champagne due to the escape of gas has long made some process of perfect air-tight sealing desirable. M. Villon accomplishes this by covering the cork and a part of the neck with a thin layer of copper electrically deposited. For this purpose the neck of the bottle is covered with a conducting substance such as black lead, zinc, or copper powder, and plunged in a galvanic bath. This bath has a cover of paraffine wood, with conical holes, which are lined with copper rings. All these rings are connected among themselves, and with the negative pole of the dynamo; while a copper sheet in the bath is connected to the positive pole. The bottles are simply inserted in the holes, neck down, and when a layer 2-10 to 3-10 of a millimetre has been deposited the current is stopped. The deposit may be gilt, silvered or given any desired shade in special baths. The process of course can be employed to seal bottles for mineral waters, preserves and a variety of products.

Fresh Water in Granite.

Baron Nordenskjold has shown practically that water can be found by boring into granitic and other crystalline rocks, to a depth of from 100 to 170ft. He proceeded on the theory that the variations in temperature ought to cause shearing strains between the upper and lower layers of the rock, which would make horizontal crevices into which water from the surface would percolate, and that the water would be fresh. A well was sunk in the islet of Arko, off the Swedish coast, in 1864, and 110ft. fresh water was found, supplying 4,400 gallons a day. Since then, six other wells have been bored and water found at about the same depth. The object of the research was to provide lighthouses and pilot stations with a permanent and plentiful supply of water.

Cornelius Hertz as an Inventor.

In a recent interview Dr. Cornelius Hertz, at present a fugitive from French justice at Bournemouth, England, and who is described as worn with anxiety and pain and clearly dying, declared in broken utturances that he would leave a great invention to be patented and developed. The gist of the invention is an enormous improvement in telegraphy, by which more than 1,000 words can be transmitted by long submarine cables in the same time that 20 words can be sent now. The invention, the doctor claimed, would allow of cabling 50 words at a cost of five cents. He dwelt upon the influence that the invention would have upon the newspaper of the future, and said that he intended, in granting royalties, to reserve all rights as far as they applied to news. The invention, he said, would render submarine telephony and multiplex telephony feasible. Among those engaged in his laboratories in France on the experiments which have resulted in the invention he mentioned Edison's nephew.

Portable Electric Propeller for Boats.

The cut herewith is of a much needed and one of the most unique of inventions: an electric propeller that does not require a special boat for its use as it is as easily shipped and unshipped from boat as an ordinary rudder and weighs but thirty-five pounds.

The rate of speed claimed is from three to five miles an hour according to circumstances and is usable on any row boat up to 18 feet long. In use it can be moved in any direction and even turned entirely into the boat if clogged by grass or weeds. The batteries supplied with it are the Crowdus' Primary, which received the highest award at World's Columbian Exposition, and is in four separate parts each weighing twenty-five pounds, giving about one-third horse-power, or any other batteries

NEW ELECTRIC PROPELLER FOR BOATS.

can be used of like voltage. For use in Florida this winter for hunting, fishing and pleasure it should prove valuable. Frank S. Allen, successor to Electric Boat Co., of New York, 136 Liberty street, New York City, will give any further information or show how practical it is on the lake.

Summer Vacation Tours.

The Baltimore and Ohio R. R. Co. now has on sale at all its offices east of the Ohio River a full line of tourist excursion tickets to all the lake, mountain and sea-shore resorts in the Eastern and Northern States and in Canada. These tickets are valid for return journey until October 31. Before deciding upon your summer outing it would be well to consult the B. & O. Book of "Routes and Rates for Summer Tours." All B. & O. Ticket Agents at principal points have them, and they will be sent postpaid upon receipt of ten cents by Chas. O. Scull, Gen'l Passenger Agent, B. & O. R. R., Baltimore, Md.

Since Aug. 4, the electric locomotive in the Baltimore tunnel has been hauling the entire freight service of the B. & O. line through the tunnel, and on Sept. 6, it made a speed test at the rate of 61 miles an hour, equal, it is said, to about 75 miles an hour on the level.

An Invention for Printers.

B. E. Hartman has invented a casting box for stereotyping that he thinks will be of great value in printing offices, where it is required to reproduce small cuts or standing advertisements. It will also be useful for reproducing large letters and wood type in fonts that have become depleted by broken type. The device is a simple one and consists of a box that has movable sides, so that the space to be inclosed can be regulated to the size of the body of type or cut that is to be reproduced. After the sides have been adjusted to the type a matrix is placed on the type and by means of a screw, pressure is applied and an impression taken, the matrix is then dried and the type removed without changing the size of the box and the matrix is placed on the bottom. As the box is type high, when it is filled with molten type metal the resulting block will be a duplicate of the type that was used for the matrix former. A number of the casting boxes will soon be put on the market. The invention does away with the usual labor needed to prepare stereotyped cuts, as the box is accurately made and no trimming is needed.

Latest Thing in Bicycles.

An inventor who has recently perfected a device for mending punctures in bicycle tires, is also confident that the day is not far distant when the chainless bicycle will take the place of the present bicycle. He has been experimenting in this direction for several years and has perfected a bicycle which dispenses with the sprocket wheels, chain, 40 per cent of the frame, and the ordinary pedals and pedal cranks. By its peculiar construction, say if 100 pounds is placed upon the saddle, it will take 40 pounds to raise the front wheel; hence it is perfectly safe. The driving levers have a raise and fall of 14 inches; hence the rider's foot travels 28 inches, while by the present chain bicycle the rider's foot travels about 42 inches. The driving levers being nearly double the length of the present pedal cranks now used on the chain bicycle, it is claimed an increase of power is obtained—hence an increase of speed. The inventor will construct the frame of his chainless bicycle of bamboo, as he has recently discovered a process to prevent bamboo from splitting, which has been a great drawback in the use of the material for bicycle frames.

In forestry, Germany stands first in the nations of the world. The State forest area of Prussia is 6,000,000 acres, producing an annual net income of about $5,800,000.

According to expert calculations the coliseum of Rome seated 87,000 spectators, while 60,000 more could have found standing room. The external circumference of the coliseum as it stands to-day is 1,728 feet, its long diameter 615 feet, its short diameter 510 feet. The arena is 279 by 296 feet and the height of the building is 156 feet. There are still standing four stories of the original structure. It was in all probability the largest building of auditorium arrangement ever known.

petition and made the great event a fizzle except to demonstrate the superiority of our boat. Too much credit cannot be given to Messrs. Iselin and Gould who generously contributed funds to build the craft which now is the pride of all America.

We are indebted to "Seaboard" for the cuts and above description.

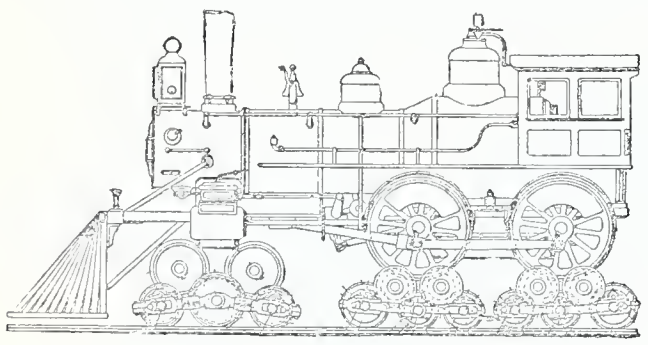
NINETY MILES AN HOUR.

A New Style of Engine and What is Claimed for it.

There is now being built at the Baldwin locomotive works in Philadelphia, says the "New York World," an ordinary locomotive with driving wheels of five feet diameter, which, it is said, will as soon as completed draw a train of cars from Philadelphia to this city in an hour.

This claim is not made by the Baldwins. They have nothing to say on the subject. They are simply building the locomotive for private parties and are to receive their regular price of $10,000 for it. When it is completed their part in the matter is ended. The gentleman who is paying for the locomotive is W. J. Holman of Minneapolis, an elderly inventor, who has been in the railroad business all his life and who has now invented something which, it is claimed, will completely revolutionize railroading.

It is not pretended that the ordinary $10,000 locomotive which the Baldwins are building would, if set upon any railroad track, be able to travel ninety miles an hour. The locomotive is not however, to be set on the rails as engines generally are. When it is completed it is to be placed on what are known as the Holman friction-geared trucks, which will raise it thirty inches above the surface of the rails. It will be just like any other locomotive except that



THE HOLMAN LOCOMOTIVE.

each of its driving wheels rest upon and between three other wheels that finally rest on the rails. The instant the drivers of the locomotive begin to turn they necessarily through friction give an opposite rotary motion to the small wheels upon which they bear, and these small wheels just as necessarily give a forward rotary motion to the third set of wheels upon which they are bearing. The natural and inevitable result is that one revolution of the locomotive's driving wheels, by this multiplicity of wheels in pyramid form, carries the locomotive forward just twice as far as a single revolution if the driving wheels be on the rails themselves. In other words, the speed of the engine, whatever that speed might be on the rails themselves, is exactly doubled by the use of this newly invented truck.

In an experiment which was made with an ordinary locomotive thus mounted in Minnesota, on a branch of the Northern Pacific railroad recently a speed of eighty miles was said to have been easily attained. The invention has been kept quiet, it being the purpose of those interested to say nothing about it until practical utility was demonstrated by a run from Philadelphia to New York within an hour's time. That, it is believed by the inventor, will be the shortest and quickest way of letting the world know that a new marvel in mechanics has come into existence.

In addition to the increase of speed attainable, this new invention will, it is claimed, save millions of dollars through the diminished wear and tear upon the rails, for the weight of locomotives will then be further distributed along the track, and at no point of any rail will there be a pressure more than one-third as great as is now exerted by the driving wheels.

An electric yacht has been built for John Jacob Astor. It is 47ft. long over all, the beam is 7ft. 6ins., the draught 2ft. 1 ins.

It is now claimed that smoke never issues from volcanoes, nor are there flames from the same source. The red light seen above the volcano is the glow of molten lava reflected on the underside of the clouds of dust. The clouds of dust are never mixed with smoke. There are, it is true, bursts of steam sometimes, but rocks do not burn as coal or wood and give off the finely divided carbon which we know as smoke.

The Constitution Well Preserved.

The Constitution of the United States—the original pen-written constitution be it remembered—has been dragged from its place of concealment in the state department to be photographed. It has been decided to send a fac-simile of it to the Atlanta exposition. Of course, the Atlanta people would rather have had the original, but this could not be entertained.

The constitution is kept in a steel safe in the library of the state department. The safe, quite a pretty affair in gray and gold, is massive and strong. A combination lock protects its priceless contents, and the combination is carefully kept by one of two officials. Yesterday, however, the steel doors were swung open in order to allow a reporter to look upon the sacred pages. No document in the world has been so fraught with destiny as this very same constitution. It is to-day the foundation of the government. To see it as it came from the pen of the engrosser on the 17th day of September, 1787, is a sight worth traveling a thousand miles to witness. As is well known, there are in the state department two copies of the declaration of independence—one the official and engrossed document and the other the original draft in the handwriting of Thomas Jefferson, with all the erasures and alterations that were made before the language was finally agreed upon. In the case of the constitution, there is only one copy—the final engrossment, with the signatures duly attached. As thus preserved, it consists of four large sheets of parchment, each twenty-two by twenty-eight inches, with the words written out in the old fashioned chirography of a century ago, and the curious capitalization of letters then in vogue. The first three words, "We, the people," are engrossed in very large black letters, so that they stand out in bold releif. On the last page are the signatures of George Washington, who signed himself as "President and Deputy from Virginia." Many of the names are closely associated with the early history of the republic—Alexander Hamilton, Rufus King, Gouverneur Morris, B. Franklin, Daniel Carroll and Roger Sherman being among the number.

The constitution is a most excellently preserved document. The ink has faded a little, but not sufficiently to detract from legibility or appearance. The autographs are especially clear. This might have been the case also with the declaration of independence, but it so happened that when a facsimile of that paper was attempted in 1824 irreparable harm was done to it through carelessness and ignorance. In the case of the constitution the utmost care has been observed and no injury has resulted.—Washington Post.

An Iconoclastic Age.

This is, indeed, an iconoclastic age. Not only does it witness the destruction of monuments that have survived hundreds, nay, even thousands of years, but from all appearances it is unlikely to leave to posterity any lasting memorials of its own, in spite of all the vast sums of money that are being spent for that purpose. From various parts of Europe, and in particular from England, comes the news of grand old cathedrals such as, for instance, those of Winchester and Salisbury, betraying such signs of decay as to render it a question whether they are not beyond repair, while in London Paris, and Rome, as well as here in New York, the authorities are endeavoring in vain to find means for arresting the process of disintegration apparent on the obelisks which were hewn out of Egyptian granite more than three thousand years ago, and which have presented few tokens of the ravages of time until lately. The same is the case with memorials of more modern construction, and even the Houses of Parliament at Westminster, built only fifty years ago of a limestone specially selected for its durability, are literally crumbling away. Scientists ascribe this state of affairs to the condition of the atmosphere vitiated by the presence of smoke. But if the air of the great cities of modern civilization is so frightfully poisonous as to disintegrate even granite monuments that antedate the Sphinx, what must be its effects upon the human body?

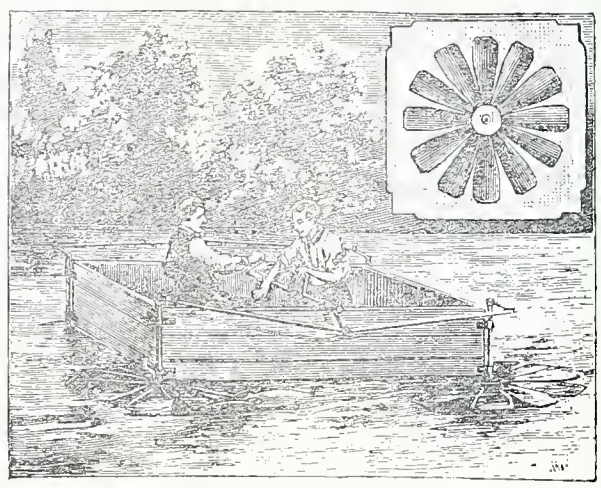
A paving material, invented by Mr. Lohr, of Frankfort-on-Main, is thus described in the "Zeitschrift fuer Transportwesen": Asphalt-powder is mechanically amalgamated with cement-concrete, in suitable and varying thicknesses and under high pressure. The blocks produced are laid in mortar on a concrete foundation for roadways, or on well-rolled soil for footways. For carriageways a thickness of 2½ ins. is used and 1¾ ins. for footways. A trial of one year on much used tramways in Frankfort has been very satisfactory. Experiments prove a complete internal mixture of the two materials, and the pavement is noiseless, easily laid, and quickly repaired, and has excellent wearing qualities. No idea of the cost is given.

Electricity from Coal.

It is said that a new electric battery of a very interesting sort has been devised by Dr. Borchers of Driesburg, in Germany, its chemical peculiarity being that the current is generated, not by the solution of metal, but by conversion of hydro-carbons and carbonic oxide into carbonic acid. As this is practically the same reaction that takes place in burning coal, the useful energy derived from the oxidation of a given weight of carbon in the battery can be directly compared with the effect of burning coals or coal gas to drive a steam engine, or in a gas engine. It is well known that a steam engine utilizes about 12 per cent under the most favorable circumstances of the theoretical energy produced by the oxidation in the boiler furnaces of the coal used to drive it; and a good gas engine utilizes about 20 per cent, while Borcher's battery is said to have delivered at times, in available form, 38 per cent of the energy liberated by the consumption of carbon in it, and at no time to have delivered less than 26 per cent. It would be curious if the oxidation of carbon in the wet way, in a battery, should give more than three times as much power per pound of coal consumed as burning it in a boiler furnace; but this is just what is claimed for the new battery, and it is obvious that if the claim is sustained it will not be long before steam boilers are abandoned and power derived entirely from batteries and distributed through wires and electric motors to persons desiring to use it.

Navigation at High Speed.

A boat in water sinks until the weight of the fluid it displaces equals its own weight; to impel it in a forward direction we must overcome the resistance offered by the water to the vertical section of the immersed portion. If the boat is flat-bottomed and is driven at a sufficient rate of speed, the weight which keeps it immersed enters into composition with the impelling force; consequently, the vessel sinks less deeply, or is even lifted so as to glide



NEW BOAT PROPELLER.

upon the water. Of course, the resistance to its process is in this way greatly lessened.

As soon as the propelling force ceases to act, the boat sinks again. This is illustrated by the sen sation a railroad traveler experiences on a fast train whose speed is abruptly slackened. His weight, at this moment, appears to increase, and he feels as if sinking in his seat, just as a bird would tend to fall when arrested in full flight.

It is not easy in practice to impart to a floating vessel, by means of a motor on board, a speed sufficient to lift it fairly out the water; but this result can be attained indirectly as was proved by the following experiment, hitherto unpublished, which dates from as far back as 1876. The vessel was rectangular in shape, and driven by four flat helices or paddle-wheels, having their blades slightly inclined from the horizontal. A bent axle was connected with the wheels, and worked by one or two men, who thus propelled the craft. The latter began to rise as soon as the wheels were set in motion, and was actually sustained above the water as long as these revolved fast enough, which they were easily made to do. The resistance to the rotary motion was found not to increase with the vessel's rate of speed, because the current thereby occasioned, while opposing this motion upon one-half of the wheel's diameter, was favorable to it on the other half.

The author is of opinion that by this process it might be possible to attain the highest speed permitted to man on the earth's surface. To realize our utmost anticipations in this regard, it would be necessary to bring about a composition of forces between the horizontal speed and the weight carried—a problem we should not be afraid to grapple with.—De Sandeval, in *La Nature*.

The America's Cup Yacht Races.

The first of the 1895 races for the America's cup, which was sailed Saturday over a course of fifteen miles to windward and return, between the English challenger Valkyrie III and the American defender of that name, was won fairly and squarely by the Defender. It was 12.10 when the preparatory gun was fired. Immediately the yachts began to jockey for the most favorable position. It was only 46 seconds after the starting gun was fired, at 12.20, that the Valkyrie crossed the line. The Defender followed four seconds later on her opponent's weather quarter. As they went over the Valkyrie shook out of stops a baby jip topsail. The Defender people were not satisfied with so small a sail on their outer stay and spread a No. 2. The wind was then blowing about five miles an hour. There was something of a swell on the sea, but the water could not be called rough by any means.

VALKYRIE.

The Valkyrie did the faster work and soon slipped by the Defender, and even Captain Hank Haff said that it was Valkyrie weather. The yachts stood on the starboard tack until 12.39, when Defender was first to go about, shortly followed by Valkyrie. The challenger continued to gain advantage, and Defender was held up very close to the wind, and by so doing became blanketed. At 12.47 Defender was eased off and she began to increase her speed and gain on the English boat. The breeze freshened, and the Defender, with her sails full of wind, went very fast, but she was not better than an eighth of a mile to leeward. On this tack head seas were encountered and both were pounded a great deal, Valkyrie came about at 1.12 and Defender followed her at once. At 1.48 Valkyrie came about and made an attempt to cross Defender's bow, but the challenger was enabled to weather the Yankee yacht and as she passed under Defender's stern there was a great shrieking of whistles from the fleet.

Defender was first to come around to starboard and head for the outer mark. This was at 3.25. It looked just then as though Defender was a quarter of a mile to the good. Valkyrie came about fifteen seconds later, well away on Defender's lee quarter. Defender passed first by three minutes and twenty-three seconds, when the boats reached the mark and got around they eased off sheets on the starboard side, set balloon jib topsails and sped for the finish. The same sails were held on both ships all the way to the finish line, while the wind gradually dropped to its original strength of about five miles an hour. In all the reach Defender continuously increased her lead over Valkyrie and finished eight minutes and forty-nine seconds ahead of her.

It was, taken altogether, especially the concluding part of it, after so much had been said about Valkyrie's great powers in light weather, one of the most interesting races that ever took place. When the Defender crossed the finish she was greeted by cannons, whistles, tin horns and the waving of handkerchiefs to an extent that entirely fitted the victory of a yacht which all experts agree is the fastest machine for her purpose that the world ever saw.

THE SECOND RACE.

On Tuesday the second race was sailed, with the result in favor of the British boat. But it was the most extraordinary race that has ever taken place in American waters. The Valkyrie III won by a margin of 47 seconds, but it was a victory barren of glory, so far as any indications of superiority is concerned, possibly even barren of value towards winning the cup, for it was won under the protest of the American yacht, and on the merits of that protest the committee in charge has yet to pass. In manœuvering at the start, and before crossing the line, the Valkyrie fouled the Defender, the result of which was the weakening of the Defender's topmast, compelling her to cover the entire course seriously handicapped by want of a proper spread of canvas. Notwithstanding this fact, she made an extraordinary race of it, proving the wonderful boat she is.

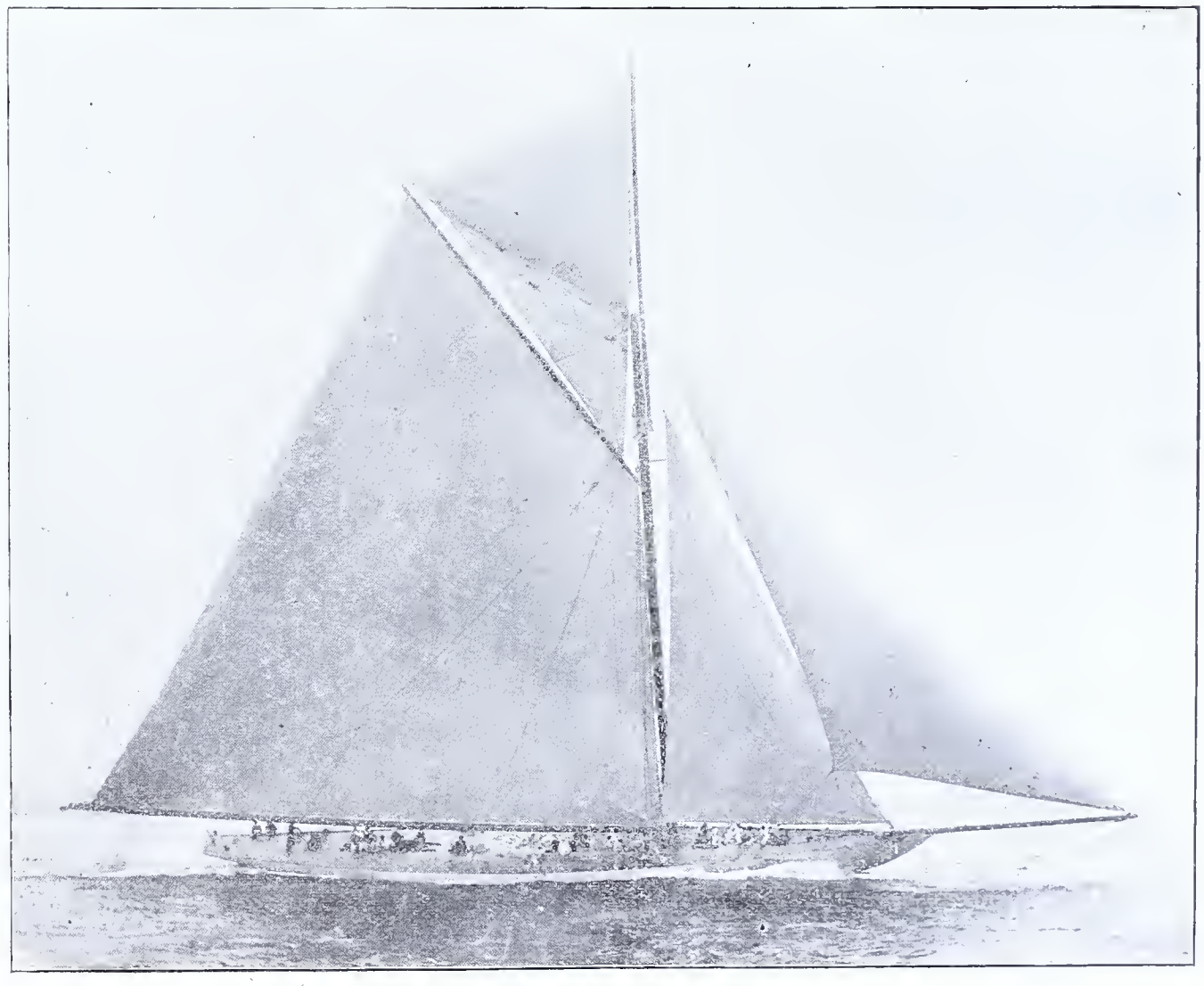
The following official notice of the protest was posted at the New York Yacht Club:

"Defender protests Valkyrie on the ground that she bore down on her just before reaching the starting line, thereby causing a foul which resulted in Defender's carrying away her spreader and springing her top mast."

This notice was signed by Messrs. Kane, Grinnell, Griswold and Canfield.

THE THIRD RACE.

The yachting world was out in vast crowds for the third attempt, a fine breeze was blowing and a splendid race was promised. Unfortunately the owner of Valkyrie III sulked and ordered his boat to sail over the starting line and then return home. His letter to the Cup Committee gave the flimsy excuse that the excursion steamers crowded too near; the real reason probably was that he did not care to undergo the mortification of defeat. And so the the cup was won and fairly won by the gallant Defender, but the withdrawal of his yacht by Lord Dunraven disgusted all lovers of fair and open com-



DEFENDER.

Patents for Methods.

Walter F. Rogers in American Law Review.

In an article of twenty pages Mr. Rogers plainly states the disastrous effect which the case of Risdon Iron and Locomotive Works *v.* Medart *et al.* must have if accepted in the spirit which pervades the opinion, that of hostility to "mechanical processes" in general. He shows that the court refused a set of claims without any consideration of their standing in the arts, but solely because the claims were mistaken for the "mere function of a machine," and exposes the fallacies of the arguments used in the opinion in the endeavor to place the claims under the objectionable classification. He recites the growth of methods and processes in the patent systems, defines their limits, especially as compared to the "function of a machine," analyses the citations of the court in such a manner as to emphasize their lack of force and application, cites nearly forty pertinent cases from all the grades of the Federal courts, in which "mechanical processes" were directly or indirectly sustained, and concludes with a statement of the examination to which the claims of the patent in suit were entitled under the statutes and a summary of the teachings of the decisions of of the courts prior to the Risdon case.—EDITOR.

The Supreme Court of the United States may still, upon occasion, be the final tribunal in patent causes, but it has practically concluded its work as an appellate court in such causes. It is rounding out the jurisdiction of a century, and the decisions of the term just past must have a peculiar interest and force. It may be taken that in the determination of its patent docket, the court has purposed summing, whenever the cause permitted, the results of its deliberations since the case of Tyler *v.* Tuel, in 1810. Its opinions and language will, of course, form the basis of subsequent argument, and in many cases, of decisions and practice in the lower tribunals. * * * * *

It is the purpose of this paper to show that the decision of the Supreme Court of the United States in the case of Risdon Iron and Locomotive Works *v.* Medart *et al.*, is directed against "mechanical processes" generally, and is accompanied by an opinion upon "processes" which it is believed suggests a mistaken and hurtful doctrine, and which, if accepted by other tribunals, must be disastrous to a class of meritorious claims.

It has been argued that though Mr. Justice Brown did elaborately distinguish processes and the function of machines, the decision means only that the claims of the patent No. 248,597 to Medart involve no new method, but merely a higher degree of finish consequent upon the use of improved machinery. That is, that by the characterization of the claims of the patent as to "function of a machine," he did not intend to classify claims of the same kind, but merely to say that in the particular patent the only possible or described novelty is in the machinery. But if the decision do not so state, the language of Mr. Justice Brown supplies the plainest evidence that he thinks no "process" good that does not involve "chemical or similar elemental action" or consist in the "use of one of the agencies of nature" for a practical purpose.

It may be surmised that his associates, agreeing with the decision, did not critically scrutinize the language of the opinion. On the other hand, it must be the presumption that Mr. Justice Brown has put into words the views of the court. * * * *

The term "process," perhaps, best applies to some "chemical or similar elemental action," or to the operation of "one of the agencies of nature." A process so distinguished may be said to rely for its new result upon the properties of ingredients or agents, or the re-action of chemical agents. A "method," more immediately it would seem, suggests a mode of operation, a sequence of acts, a manipulation of material or mechanism or a modification of the usual operations of existing mechanism. Is the sequence of steps or acts, the new order, to be at once ruled out because it does not involve "chemical or similar elemental action" or does not employ "one of the agencies of nature?" The method must be met precisely as is the process—does the difference between it and the known art involve invention? There is no rule of classification or metaphysical distinction in the statute to put a bar upon the new "method." * * *

It is taken as settled, and it is agreed, that the function of a machine, *i. e.*, "the expected action of the machine," is not a patentable method because the machine is new or a pioneer. The planing of a board, the weaving of a fabric, or any mere operation of a machine carrying out an old method, accompanies the machine and may not be patented as a method. But what shall be said of a method which consists of a new order or sequence in which the functions of a machine are performed? An inventor takes old or new machinery and uses it in a new way to make a new fabric, a new hat, a new paper bag, a new lead pipe, a new oil. Are these new methods at once ruled out because they do not involve "chemical or similar elemental action" or employ "one of the agencies of nature?"

To blot out methods, all "arts" must be confined to "chemical or similar elemental action," or must in each process employ "one of the agencies of nature." The arts of that kind are but a part of the whole. Some of the arts rest almost entirely upon instruments, but to say that in any art it is not possible to invent a new method, some new way or order of using old mechanism, some new rule of action enabling new results to be reached, some improvement in the art radically new in principle, is to take from the inventor his peculiar distinction of setting aside old ideas, leaving the beaten track and overturning precedents. * * *

In the opinion the process is stated to consist of the following steps: "First, centering the pulley center or spider; second, grinding the ends of the arms concentrically with the axis of the pulley; third, boring the center; fourth, securing the rim to the spider; fifth, grinding the face of the rim concentric with the axis of the pulley; sixth, grinding or squaring the edges of the rim.

The claims are not considered with reference to the previous art. No question of invention or patentable novelty in consequence of steps is considered. They are denied the right to any such comparative treatment because drawn to the function of a machine, and therefore not within the meaning of the law.

Now it may possibly appear to the skilled ironworker that centering, grinding, boring, etc., are all matters of common knowledge, and that there is nothing whatever of novelty or invention in the order which the patent recites. Nevertheless it must be equally as clear to him that he needs only to be told the order in which these steps are to be performed, and the degree or manner of grinding, etc., to be able to proceed at once to carry out the method with the well-known tools at hand. The court says, "The four claims of the patent make no reference to the mechanism exhibited in the drawings described in the specification. All claim an improvement in the art of manufacturing, and set forth in more or less detail the various steps in that process."

We have then a set of "process" claims unobjectionable in form, clear in meaning, not including mechanism directly or indirectly, against which no prior use, knowledge nor patent is urged. Upon the face of it such claims would seem to meet all the requirements of a method claim, and to demand consideration from the standpoint of invention and the prior art. * * *

Upon a careful reading of the three patents, and especially of patent No. 248,599 to Medart, the expert patent examiner or lawyer will percieve that the specification does not clearly point out the new step, or the change from the old order to the new and this is at once strongly suggestive of a lack of novelty in the claims. A study of the claims themselves in the light of the general information of any tribunal which could pass upon them might, it would appear, incline the tribunal to say at once that there could be no invention or novelty in the separate steps or in the sequence, But the office allowed these claims, a circuit court sustained them, and upon the face of the returns no tribunal has found the method old. So that whatever opinion one might have of the novelty of the method, at first glance, the criticism might be more difficult to sustain than to state.

The specification does not describe a single machine, but an apparatus, a series of machines. Suppose flour had never been ground from wheat, or oil expressed from seed, and one should invent an apparatus taking the grain or seed and after varied manipulations producing the flour or oil. Can it be said that such an inventor has not a new method? And may he not improve upon that method? May he not omit some parts of the apparatus, change the order, reduce the number of stages, add new steps, and be entitled each time to a method claim whether or not he based is claims upon "chemical or similar elemental action" or "one of the agencies of nature?" Was the claim in Lawther *v.* Hamilton sustained because of the common use of steam? That was not the invention, the new feature of the claim, and not the reason of the court. From the broad claims stating a new industry the new method might dwindle in importance down to the disappearing point where invention merges into "mere mechanical skill" or the "mere judgment of the operator," and yet at no stage define the function of a particular machine. All such properly drawn method claims are entitled to stand up and be riddled by the citations of prior use or knowledge, instead of being buried alive in the Potter's Field of unrecognized and unclassified claims.

To sum up the teachings of decisions: The great majority of properly drawn claims for chemical and similar processes rely for their patentability upon new relations and functions given to old ingredients or agents. The patentability of the great majority of properly drawn method or manipulation claims rests upon new relations and functions given to old organisms or a new treatment of old materials. Whether the ingredients, agents or organisms be new or old the only test for patentability is the application of the statutory bars, and in this both processes and methods stand upon the same footing.

The opinion in the case of Risdon Iron and Locomotive Works *v.* Medart *et al.*, cannot make claims defining steps in the production of an article which may be performed by hand, or by a set of machines, fall under the narrow designation of "function of a machine." There is not a single decision of weight or character that supports that extreme statement. To apply the spirit of the language of Mr. Justice Brown the courts must hold that no method which can be carried out by hand or machinery is patentable. To do this, decisions of the Supreme Court of comparatively recent date must be ignored, and this single opinion must outweigh the holdings of the several courts in the many cases from which the cited examples have been selected and the crystallized convictions of the bar and the Patent Office.

Report of Commissioner of Patents.

Commissioner of Patents John S. Seymour, August 6, submitted to the Secretary of the Interior a summary of his report for the fiscal year ended June 30, 1895.

It shows that during that time there were 36,972 applications for patents received, 1,453 applications for designs, 77 applications for reissues, 2,314 caveats, 2,183 applications for trade marks, and 318 applications for labels. There were 20,745 patents granted, including reissues and designs; 1,804 trade marks registered, and six prints registered. The number of patents which expired was 12,906. Allowed applications which were forfeited for nonpayment of the final fees were 3,208.

The total expenditures for the year were $1,195,557; receipts over expenditures, $157,390, and the total receipts over expenditures to date to the credit of the Patent Office in the Treasury of the United States, $4 566,757.

Commissioner Seymour states that in the last week in June, 1895, all but one of the thirty-four divisions of the office had the work up to within one month of date, and the remaining division was between one and two months from date. At the close of the fiscal year there were 4,927 applications awaiting action on the part of the office.

Power From the Nile.

Now that the waters of the Niagara have been made tributary to human enterprize, it may be interesting to note that a similiar undertaking is contemplated in Egypt. The General Inspector of Public Works, Mr. Prompt, has just submitted to the Egyptian Government the results of his investigations during the last eight months relative to the utilization of the cataracts of the Nile for agricultural and mechanical purposes. His project includes an immense reservoir in Upper Egypt which will permit the culture of cane sugar and cotton in the place of cereals. In the furtherance of the realization of this project he proposes to establish an electric power station near Assouan, where a fall of forty-five feet will be utilized. This station would furnish 40,000 horse power, besides furnishing 500,000,000 cubic yards of water for irrigation. A fifteen-foot dam is to be built across the Nile just above Cairo, which would furnish both light and motive power at a very low price to the Egyptian capital. The cost of the entire project is estimated at $8,000,000, which will very likely be raised by private subscription.

At the Yorkshire College, Professor Goodman stated that wire ropes were not a modern invention, and that he had recently seen a bronze rope, ½ins. in diameter and from 20 to 30ft. long, which had been found buried in the ruins of Pompeii, and must have been at least 1,900 years old.

A new method of quarrying marble, an invention by George F. Clark of Albany, N. Y., formerly of Rutland, was tested recently in one of the Vermont Marble company's quarries at West Rutland, and the test is said to have been satisfactory. The stone was sawed in the quarry by a twisted wire strand which was 800 feet long. A cut 65 feet long and one foot deep was made in eight hours.

Post mortem examinations of the bodies of the blind reveal the fact that in the nerves at the ends of the fingers well-defined cells of gray matter had formed, identical in substance and cell formation with the gray matter of the brain. This proves that a man can think not alone with his head, but all over his body, and especially in the great nerve centres like the solar plexus, and the nerve ends on palms of the hands and the soles of the feet.

An Electric Tricycle Invented.

Charles H. Burrows, of Willimantic, Conn., has invented an electric carriage which he is confident is the most practical yet made. It is built in the form of a tricycle, the forward wheel being the driving wheel. This wheel is constructed with two rubber-tired rims between which is what corresponds with the sprocket in the bicycle. The electric motor is carried in a box over the driver and is connected with it by a sprocket chain. The power is stored in a battery between the two rear wheels and is carried to the motor by flexible wires. A seat capable of carrying from one to three persons is over the smaller rubber or pneumatic tire wheels. The guiding device is similar to that of the ordinary bicycle. The frame is of the bicycle style and strong enough to do the work.

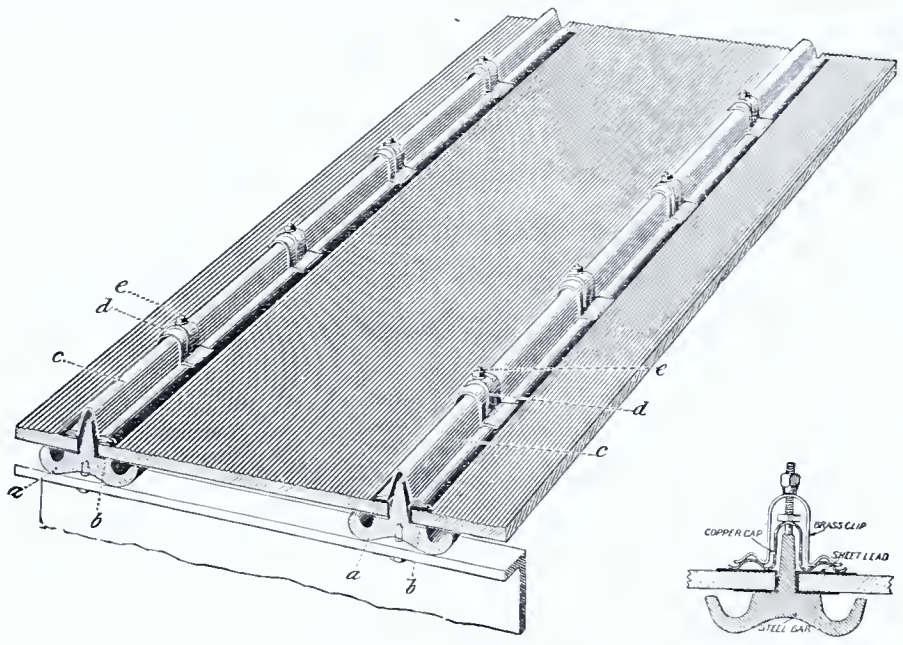
Something New in Skylights.

Mr. Henry S. DeForest, of New York, who is a gradute of the Sheffield scintific school at Yale and a practical skylight man has been devoting his time and talents for some years to the problem of skylight construction without the use of putty or cement, and as the result of his labors the Metallic Glazing Co., of New York, is now placing upon the market the DeForest patent skylights.

The system has been variously tested with care and demonstrated to the company's satisfaction that it accomplishes what is claimed for it.

As it is quite possible that the skylight may soon be placed upon one of the finest buildings in this city, the system having been specially mentioned in the specifications, we give a brief illustrated description of same and its advantages.

The main patent embraces in substance a steel bar (*a*) which supports the edges of the glass. A



A NEW SKYLIGHT.

packing of soft lead (*b*) with which the edges of the glass are wrapped; a metal cap (*c*) placed over the bar, with its lips resting on the lead; a spring metal clip (*d*) placed over the caps at an interval of every eight inches or thereabouts, and secured to the steel bar by a brass bolt and nut (*e*).

Its special advantages are: First, as the spring brass clip does not bear on the top of the cap, pressure applied to the nut is transmitted by the clip directly to the lips of the cap on each side of the bar, making a tight but not rigid joint. Second, the clip forms a cushion that responds to the contraction or expansion of the glass and metal and thus breakage is avoided. Third, the construction is fire proof, being entirely of metal and non corrosive material, and the metal packing is not affected by acids or gases, nor can it be dislodged by contraction, expansion or viabration, Fifth, it is simple, and broken lights of glass can be easily replaced, there being no putty or cement used. It is especially adapted to railroad depots, manufacturing buildings, churches, office buildings and large skylights generally.

The new waterworks tower at Eden Park, Cincinnati, Ohio, is the highest artificial structure in the United States. The floor of the tower, reached by elevators, is 522ft. above the Ohio River. The base is 404ft. above the stream.

The powder used in big guns is queer looking stuff. Each grain is a hexegonal prism an inch wide and two-thirds of an inch thick, with a hole bored through the middle of it. In appearances it resembles nothing so much as a piece of wood. If you touch a match to it it will take seven or eight seconds to go off.

A New Drag Anchor.

L. M. Furman, of San Francisco, a practical seaman, has invented a drag or sea anchor which combines both simplicity and efficiency and will doubtless be adopted by sea-going vessels.

It is a large bag, made of strong canvas, attached to an iron ring about ten feet in diameter. This drag is put over the weather bow of the vessel, with several hundred feet of rope, and permitted to sink about twelve or fifteen feet below the surface of the water. This is easily regulated by a small buoy attached to the drag with line of that length. The canvas bag sinks below the base of the waves, consequently the rollers, which drive the vessel leeward, have no effect upon the drag, which, filled with water, keeps the ship head on to the sea constantly. The vessel cannot fall off, and it is safe to say that had the Colima had this simple contrivance the frightful disaster might have been averted.

When it is desired to pull the drag aboard, the "tripping lines," which run through small rings on the iron frame and around the bag, are pulled. This draws the canvas into a small compass, turning the whole contrivance sidewise and causing it to be easily hauled through the water up to the surface and then to the bow of the vessel. When not spread it is so small that it may be lowered over the side of the ship in the hardest blow, as it is simply taken up by hand and thrown into the sea, when it opens and begins to pull on the bow of the steamer.

Obituary.

Mr. Llewellyn Deane, one of the oldest patent solicitors in Washington, D. C., died on the 4th of last month. Mr. Deane had been ailing for some months past, but it was not supposed his condition was serious, and his sudden taking off was a sad surprise to us.

Llewellyn Deane was borne at Ellsworth, Me., April 23, 1829, at which place he lived until 1861. He graduated at "Bowdoin" in 1849, became a lawyer and practiced in partnership with his brother Henry. In 1858 he was a representative to the State Legislature from the city of Portland. In 1861 he moved to Washington, where he shortly after held an important position in the Patent Office. In 1873 he resigned his official position and again practiced law, embracing patent law and patent soliciting.

His genial face, snow white hair and erect carriage made him a familiar figure to nearly everyone in Washington.

The captain of the cruiser New York is made responsible for some vagaries of the Emperor William when visiting the vessel during the Kiel ceremonies. The German Emperor visited the engine room of the New York at one o'clock in the morning, and making a reference to the bulkhead doors, said "Could it be done now?" By that time it was two o'clock in the morning, and the men were all asleep in their hammocks. Though at such an unreasonable hour, Captain Evans, of course, promptly consented, and a general call to quarters was immediately given. The journal proceeds to state that the men rolled up their hammocks and took their stations, and in exactly one minute 30 seconds the bulkhead doors were closed, the guns primed, and the New York was ready for battle. "Wonderful!" ejaculated his Majesty, and well might he do so. For men to wake out of their sleep, rise, dress, roll up their hammocks, be at their stations, all in one minute and a half, certainly proves that the age of miracles is not over.—*Seaboard.*

Books and Magazines.

ALTERNATING ELECTRIC CURRENTS. By Edwin J. Houston, Ph.D. and A. E. Kennelly, Sc.D. New York: The W. J. Johnston Company. 225 pages, 77 illustrations. Price, $1.00.

This is the first of ten volumes of an "Elementary Electro-Technical Series," designed to give concise and authortaitive information concerning those branches of electro-technical science having a general interest. The subjects to be treated are alternating currents, electric heating, electromagnetism, electricity in electro-therapeutics, arc lightning, incandescent lighting, electric motors, electric street railways, telephony and telegraphy.

Although the book is primarily designed for the general public, yet it should not fail to prove useful to electricians generally and to elementary electro-technical students, and even of interest to engineers, as disproving the prevalent belief that it is impossible to treat of alternating currents without the use of higher mathematics.

The book is profusely illustrated, printed on paper of a fine quality, and substantially bound in covers of a special design.

* * *

"Hall's Outline of Infringement of Patent." Mr. Thos. B. Hall of the Cleveland bar has undertaken to compile in a neat volume brief sketches of the law and decisions pertaining to infringement of patents. This is the most common form of litigation that the patentee has to encounter, and the courts abound in numerous carses relating to the vexed questions of patent rights. This book will prove a most valuable summary of points decided by the highest judicial tribunal of the land. It should be in the hands of everyone interested in the law of patents.

* * *

"A Drama of the Revolution." A patriotic son of New Jersey, Col. Ethan Allen, has written a most interesting history of the Revolution in the form of a drama—the facts all being attested by copious foot notes. It is a work all should read for it brings before us the sombre panorama of the great struggle which our fathers engaged in when battling for the rights of liberty, and we who enjoy the matchless heritage which has come down to us from them cannot be too familiar with the stirring events of the War of Independence.

* * *

After November 1st., the *American Engineer* will be published bi-weekly, and will appear every alternate Thursday. Each number will contain one-half as much reading matter as is now given in the monthly issue. The price, per number, will be reduced to 10 cents, and the annual subscription to subscribers in this country, Canada and Mexico to $2.50. Owing to the additional postage the rate to foreign subsribers will remain $3.50. Some changes, which it it hoped will be improvements, in the scope and character of the paper will be made, and will be announced later. It is also thought that the more frequent publication will enable us to keep closely in touch with current events and the advancement of engineering art and science, and that the change will materially increase the interest of the paper to our readers and its value to our advertisers.

A practical test was made of aluminum in the construction of small boats by Mr. Walter Wellman, who had three constructed to carry his polar expedition last year. These boats, it is said at the Navy Department, have been brought back to Washington, and an examination made some time ago showed that the material had so deteriorated that it could be easily crumbled in one's hand.

Another whaleback steamship, the largest yet built, was recently launched on Puget Sound. It is destined for the route between San Francisco and Panama, to determine the value of whaleback types of steamships in the ocean carrying trade. Should the boat prove a success, a regular line of whale backs will be established.

Something About Asbestos.

Asbestos is a wonderful substance. The name comes from a Greek word meaning inconsumable. Fire will not burn it, acids will not gnaw it, weather will not corrode it. It is the paradox of minerals, for it is quarried just like marble. The fibers of which it is composed are soft as silk and fine and feathery enough to float on water. Yet in the mines they are so compressed that they are hard and crystalline like stone. Although the substance has been known for ages in the form of mountain cork or mountain leather, comparatively little has been learned as to its geological history and formation. A legend tells how the Emperor Charlemagne, being possessed of a tablecloth woven of asbestos, was accustomed to astonish his guests by gathering it up after the meal, casting it into the fire, withdrawing it later cleansed, but unconsumed. Yet, although the marvelous attributes of asbestos have been known for so long, they were turned to little practical use until about 20 years ago. Since that time the manufacture of the material has grown until it can take its place with any of the industries of this country. Indeed, so rapid has been its progress and development, that there is almost no literature of any kind on the subject, and to the popular mind, it is still one of those inexplicable things.

Up to the late seventies, nearly all the asbestos came from the Italian Alps and Syria, but one day explorers discovered a rich deposit in the eastern township of Quebec. Companies were formed, and, in 1879, the mines were opened. Remarkable as it may seem however, although the Canadians started factories, in the operation of which they were substantially backed by English capital, it was an American concern, with headquarters in New York, that developed the industry most rapidly. The company has now grown so large that it has branches in nearly all of the large cities of the country, and the machinery used is specially made and peculiarly adapted to the manufacture of asbestos articles. There are also a large number of factories in England. The veins of chrysotile, as the Canadian asbestos is called, are from two to four inches in thickness, and are separated by thin layers of hornblende crystals. The nearer to the surface the veins run, the coarser are the fibers and the less valuable. The mining is done by the most improved machinery. Holes are drilled in long rows into the sides of the cliffs by means of steam drills. They are then loaded with dynamite and exploded simultaneously in such a way that a whole ledge of rock falls at once. Then the workmen break out as much of the pure asbestos as possible, load it into tubs or trucks, which are hoisted out and run along to the "cobhouse." Here scores of boys are kept busily employed crumbling or "cobbling" the pieces of rock away from the asbestos and throwing the good fiber to one side, where it is placed in sacks for shipment to the factory. The greatest work in connection with the mining of asbestos is in disposing of the waste rock and the refuse of the quarry. Only about one-twenty-fifth of the material quarried is real asbestos, and the rocky parts have to be carried to the dumps at great expense. As the asbestos comes from the mine it is of a greenish hue, and the edges are furred with loose fibers. The more nearly white asbestos is the better its grade. The length of fiber is also of great importance, the longest being the most valuable. From the mines the asbestos is taken to the manufactories in the United states.

The Carnegie Company will shortly erect six blast furnaces close to their steel works at Duquesne, Pa., upon 100 acres of ground about four miles from their Homestead Works. The furnaces will be the largest ever built and the whole plant equipped with the best apparatus in such a manner that most of the work will be done automatically by electric and steam power. When completed, the electric power station will generate about 3,000 H. P. for light and power. There will be about 30 very powerful electric cranes, 3 or more electric traveling bridges over 250 feet span, the largest ever built for unloading ore, about 15 electric motor cars, half a dozen electric conveyors and a large number of stationary motors for driving miscellaneous apparatus.

The Recent International Yacht Race.

Speaking of the recent yacht race which resulted in much disappointment and disgust, Public Opinion says: Everyone is dissatisfied and out of patience with the affair. There is some difference of opinion as to the cause of the snarl in which the race ended and as to proper division of the responsibility therefor. But Lord Dunraven comes in for the burden of general condemnation in this country and is also severely critcised in England, although there is a tendency in some quarters to admit that there are mitigating circumstances even in his case.

Through all the differences of opinion that befog the issue, however, one fact stands out clear, a fact that is admitted by the unprejudiced in England as well as in this country. That fact is that Defender is the better yacht, and that despite the unfortunate wrangle in which the contest closed it has been established beyond reasonable doubt that had the series of races been fairly sailed according to program Valkyrie must still have failed to win the cup. Thus in ten successive contests in yacht building and yacht sailing—in 1851, 1870, 1871, 1876, 1881, 1885, 1886, 1887, 1893, and 1895—American genius and skill have made an unbroken record of victory. But twice, indeed, in all these contests has an English yacht come in ahead, even in one of the trial races, once in 1871, and again in the second race this year; and in both cases the American yacht had been disabled. Britannia may still rule the waves—in song at least—but she has yet to learn how to build and sail a yacht fo beat Columbia.

Franklin's Letter on Electrical Stroke of the Torpedo.

It has long been supposed that the Stroke given by the Torpedo was the Effect of sudden violent muscular Motion. It is now suspected to be an Effect of the Electric or some similar subtil Fluid which that Fish has the Power of acting upon and agitating at Pleasure.

To discover whether it be the Effect of a subtil Fluid or of muscular Motion, let the Fish be touch'd with the usual Conductors of Electricity, viz.:—Iron or other Metals; and with the known Non-conductors, dry Wood, Glass, Wax, etc. If the Stroke be communicated thro' the First and not the Latter, there is so far a Similarity with the electric Fluids, and at the same Time a Proof that the Stroke is not an Effect of mere muscular Motion.

Let it be observed whether the Stroke is sometimes given on the near Approach of a conducting Body without actual Contact; if so, that is another similar Circumstance. Then observe whether in that case any Snap is heard; and in the Dark any Light or Spark is seen between the Fish and the approaching Body. If not, there the Fluids differ.

Let a Number of Persons stand on the Ground, join Hands, and let One touch the Fish, so as to receive the Stroke. If all feel it, then let him be laid with his Belly on the Plate of the Metal; let one of the Persons so joining Hands touch that Plate, while the farthest from the Plate with a Rod of Metal touch the Back of the Fish; and then observe whether the Force of the Stroke seems to be the same to all in Circuit as it was before, or stronger.

Repeat the last Experiment with this Variation. Let two of the Persons in the Circuit hold each an uncharged electric Phial, the Knobs at the Ends of their Wires touching. After the Stroke, let it be observed whether those Wires will attract or repel like Bodies, and whether a cork Ball suspended by a long silk String, so as to hang between the Wires at a small Distance from the Knobs of each, will be attracted and repelled, alternating to and from each Knob; if so, the Back and Belly of the Fish are at the time of the Stroke in different State of Electricity.

B. FRANKLIN.

LONDON, Aug. 12, 1772.

—Electrical Engineer.

Prof. James Balwin, author of "The Book Lover," has once more became the book readers' friend. The Werner Company, of Chicago and New York, have just published an excellent work written by Professor Baldwin, entitled "A Guide to Systematic Readings in the Encyclopedia Britannica." This great encyclopedia is a book of references and Professor Baldwin's new work tells the reader just how to refer to it in the easiest, quickest and most profitable way. Every library that contains an Encyclopedia Britannica ought to have this valuable helpmate.

Bicycling Made Easy.

Augustans must not be surprised if in a few weeks they should see a bicycle going up and down Broadway being propelled not by the rider, but by a small electric motor that has been invented recently as a means of bicycle propelling.

The bicycle with its electrical equipment weighs 64 pounds and is capable of carrying 150 pounds for tweney-four hours at the rate of thirty miles an hour. The power is derived from an accumulator storage battery placed under the saddle which is connected with the rear wheel by a woven silk belt. The current is controlled by push buttons located near the handle bars. It is also equipped with an electric lamp and an electric buzzer to warn pedestrians out of the way.

This invention is from the brain of an Irishman and while this son of Erin was cudgeling his thinking box to put his idea into practical use the equally fertile brain of an ingenious Yankee was hard at work on another invention, viz: striving to contrive an easy way to get on the "consarned thing." This device is called the "bicycle mount," and is intended to help beginners and feminine riders in mounting. The device by means of a clamp bracket can be attached to the lower bar of any bicycle frame. It is so arranged that the rider before mounting places his foot upon a little step. The weight of the foot throws forward and outward between the wheels two rubber-shod legs, made of steel about a foot long. The extremities of the legs are about ten inches apart and make the wheel as stable as a chair. Keeping his foot on the step the rider mounts into the seat. A lady can take all the the time she wishes to adjust her draperies before starting. When the start is made, with the first movement of the pedal the legs automatically fold back out of the way. When the cyclist dismounts for any purpose it is unnecessary to hunt a fence post or curb against which to lean his wheel. He simply presses down the step and the wheel stands upon its own feet, so to speak. By this contrivance it is possible to bring the wheel to a complete stop and yet retain an upright position.

These inventions are both of recent date but their usefulness will soon bring them into common use.

Straw Hats of Wood.

A Massachusetts inventor has patented a machine which is supplied with fine planing teeth. A log of wood cut square is fed into it, and when the log passes through it has furnished a hundred strips of wood much resembling excelsior. Their length, of course, is that of the log. It is claimed that these when moistened can be woven much more readily than straw, and make as durable a hat. The inventor says it is twice as light as straw, and that, because of its easier manipulation and cheaper cost, it will supersede the straw now used for the construction of headgear. Even women's Leghorn hats and the finest Panamas may become possible for those who can't afford them now.

Air Brake for Electric Cars.

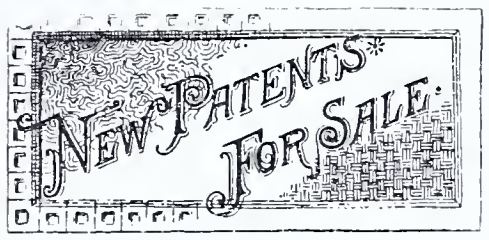
A new air brake for electric cars is being brought out by two Chicago inventors. The principal novelty is the use of a reciprocating electric motor to compress the air, the motor taking its currents from the line wire. An automatic cut-out is provided, so that the pump works only when the air pressure is reduced. The reservoir contains air enough to make several applications of the brake.

Labor Saving Machinery.

Within the last ten years, labor saving machinery has done away with a great many laborers in many particular lines of manufacture. Statistics from the European continent show that the number of carpenters has been reduced 15 per cent; shirt makers, 33 per cent; bakers and confectioners, 20 per cent; cabinet makers, 35 per cent; typesetters, 41 per cent; silk band weavers, 40 per cent, and wood cutters, 42 per cent, within that time.

Although these figures are startling, one need not imagine that by these labor saving devices all of this large percentage of men have been thrown out of work; the labor saving machinery had to be built and the large number of new industries arising with the advancement and success of scientific research, has opened new fields of employment for those who would otherwise have worked at the older tasks. The labor saving machinery has cheapened the products but not the wages.

It is estimated that over $3,000,000 is now expended annually for street car advertising against less than $300,000 in 1890.



Advertisements inserted in this column for 20 cents a line (about 7 words) each insertion. Every new subscriber sending $1.00 to THE INVENTIVE AGE will be entitled to the AGE one year and to five lines three times FREE. Additional lines or insertions at regular rates.

FOR SALE.—Half interest in my patents No. 525,039, for the United States and 47,893 for Canada. Collar Button Clasp and Shirt Combined, no collar button in neck band. A very valuable invention. A quick seller with large profits. Full information given on application. Address J. B. Wolgemuth, Mitchell, South Dakota. 8-11

FOR SALE.—Electric Heater Patent, No. 512,797, January 16th 1894, and improvements. The most economical and efficient car heater ever offered. Will sell entire, or part interest, and superintend manufacture if desired. Will take stock in a good company as part pay. Address Wm. J. Bowen, Electrician, Norwalk, Ohio. 8-10

FOR SALE.—My Coin Operated Automatic Newsboy, contains patented device for rejecting spurious coins. Effective. Device costs five cents. Will sell right to use to parties having slot machines not in competition. Address to M. M. Tomblin, Rockford, Ill. 8-11.

FOR SALE.—Patent, Patterns and Cuts of my Fence Machine; a success, and a good investment for small capitol. Send for circulars. W. H. Mason, East Monroe, Ohio. 8-10

FOR SALE.—Patent No. 537,341. Patented April 9th 1895, an Adjustable Rein Support. Will sell outright state rights or on royalty. Indispensible especially during fly time. J. F. Evins, Blodgett, Mo. 8-10

FOR SALE.—Outright or on royalty, my patent U. S., No. 540,322 and Canadian No. 47,856, being a supplemental stopper for ink bottles, (rubber) designed for use in schools, to prevent the spilling of ink. For particulars, address Helen Leadbetter, Kincardine, Ontario. 8-10

FOR SALE.—Patent No. 544,038. Draft Gate for Fire Doors. Will sell outright at a very reasonable price. To manufacture the same will cost only 2 cents a piece. No drilling or filing necessary. Address, H. R. Hoffman, 1004 Central Avenue, Hamilton, Ohio. 9-11

FOR SALE.—Will sell patent No. 522,872. Garden Hoe for $3,000. One person will perform as much labor with the hoe as three persons with other tools. Very easy to work. Blades replaced when worn. J. H. Andre Lockwood, N. Y. 9-11

FOR SALE.—My patent No. 458,052. Hitching Post Attachment. A great improvement over all others, has been thoroughly tested. With good satisfaction, can be attached to wood or stone posts. Copies of patent and specifications sent to any one desiring to investigate a good thing with a view to business. Address, S. B. Hopkins, Council Grove, Kansas 9-11

FOR SALE.—$1,000 will buy the entire U. S. patent to one of the most usefnl garden and field implements. Address, L. R. Fife, Livingston, Polk Co., Texas. 9-11

FOR SALE.—Patent No. 543,206. Gopher-Trap. Entirely new principle, the most successful catcher, simple in construction, inexpensive to manufacture. it sells on sight. Address with stamp. Albert Butzer, Deer Park, Wash. 10-12

10 Days at Niagara Falls—$10.

An early fall trip to Niagara Falls, Watkins Glen, Mauch Chunk, Glen Onoko, Rochester and Geneva, has been arranged via the Royal Blue Line and the famous Lehigh Valley route.

A special express with Pullman Parlor Cars attached, in charge of an experienced tourist agent, will leave B. & O. Station, Washington, Thursday, September 26th, 8.10 a. m., Baltimore 9.05 a. m., arriving at the Falls 11.00 p. m.

Round trip tickets, good ten days, $10.

BUSINESS SPECIALS.

Advertisements under this heading 20 cents a line each insertion—seven words to the line. Parties desiring to purchase valuable patents or wanting to manufacture patented articles will find this a valuable advertising medium.

WANTED.—A firm to manufacture on a royalty my dusting cloth holder for broom handle. No competition. Inexpensive to manufacture. Patent No. 538,269. Correspondence solicited. Address, H. Neagles, Lynn, Mass. 8-10

WANTED.—A reliable firm to manufacture and sell a game on royalty, patented by me in this country, Canada and Great Britain. Address Lieut. H. H. Sargent, 2d Cavalry, Regimental Quartermaster, U. S. Army, Fort Wingate, New Mexico. 8-10

WANTED.—The Perfection Sack Tie. The best known agents wanted everywhere. Circulars and prices free. would contract on royalty or sell whole U. S. Patents. Address, J. R. Eichenberger, Patentee, Burton City, Ohio. 9-12

WANTED.—A Spring or Gravity Motor to run fan. J. H. Snow, & Co., Indianopolis, Ind. 10-10

NOTICE.—Patent Attorneys. We make blue prints from drawings and return them the same or next day. Two prints 6x8 for 15 cents. Full size black line print for 10 cents each. Send for sample prints. D. H. Noramore, 920 7th St., N. W., Washington, D. C.

Electric.

THE Globe Electric Company, Cleveland, Ohio—to manufacture and sell electric telephones and other electrical and magnetic apparatus, and to do a general electrical business. Capital stock, $25,000. Incorporators: C. E. Collins, L. W. Bradley, Donald McKenzie, T. W. Larwood, Jr., and J. D. Barron.

A SURVEY of the route of the proposed Albany, Hilderberg and Schoharie Railway has been made under the supervision of Engineer George Yost, of Johnstown. As soon as maps are completed the company will apply for a charter. The cars be will run either by electricity or compressed air, and will carry both passengers and freight.

THE Fort Wayne and Hicksville Electric Railway, Fort Wayne, Ind—to construct, own and maintain a street railway in Fort Wayne. Capital stock, $50,000. Promoters: John S. Hart, Hicksville, Ohio; Jas. B. Colgrove, Washington, D. C.; John W. Winn, Defiance, Ohio; Aaron M. Richelderfer. Harlan, Ind.

THE Warwick Electric Manufacturing Company, Cleveland, Ohio—to manufacture and deal in storage batteries, dynamos, motors, arc lamps, electrical appliances, and erect and maintain isolated electric lighting plants. Capital stock, $20,000. Promoters: P. B. Warwick, Dan. H. Ridgway, Geo. F. Ridgway, Michael Phalen, C. N. Cunningham.

THE right of way for the proposed electric railway from Edinboro, Erie county, to Cambridgeboro has been secured from all but a few property holders along the line. Surveyors are also said to be at work looking up the best route from Cambridgeboro to Meadville. Much is said to depend on the obtaining of a franchise for a line in Meadville.

A. L. BAGNALL and T. Kogi, electricians, from Yokohoma, Japan, were among the names registered at the Hollenden, Cleveland, Ohio, a few days ago. Mr. Bagnall says that electric lights are in general use in the cities of Japan, and nearly all the stores are lighted by them. In portions of some of the streets the lights are paid for by individuals, for municipal lighting has not been taken up yet.

THE Asbury Park, Bradley Beach, Bellmar and Spring Lake St. Ry. Co., Bradley Beach, N. J.—to construct, maintain and operate a street railway for the transportation of passengers, construct and operate motors, cables, etc. Capital stock, $75,000. Promoters: Henry C. King, New York City; Alex. Bogey, Brooklyn, N. Y.; N. E. Buchanon, John Hubbard, Asbury Park, N. J.; Chas. H. Seaman, Bradley Beach.

Marry this Girl—Somebody.

MR. EDITOR:

I stained a blue silk dress with lemon juice; what will restore the color? I am making lots of money selling the Climax Dish Washer. Have not made less than $10 any day I worked. Every family wants a dish washer, and pay $5 quickly when they see the dishes washed and dried perfectly in ONE MINUTE. I generally sell at every house. It is easy selling what every family wants to buy. I sell as many washers as my brother, and he is an old salesman. I will clear $3,000 this year. By addressing J. H. Nolen, 60 W. Third avenue, Columbus, Ohio, any one can get particulars about the Dish Washer, and can do as well as I am doing. Talk about hard times; you can soon pay off a mortgage when making $10 a day, if you will ONLY WORK; and why won't people try, when they have such good opportunities.

MAGGIE R.

"BUBIER'S POPULAR ELECTRICIAN" is the name of a monthly publication which contains a vast amount of valuable information on all electrical subjects. Its department of "Questions and Answers" will be appreciated by students and amateurs desiring information or instruction on any problem that may arise. THE INVENTIVE AGE has made special arrangement whereby we can supply that popular dollar journal and THE INVENTIVE AGE—both publications one year—for $1.00.

Aftermath.

THE Baltimore Mallaeble Iron and Steel Casting Company is putting up a new building 40x210 feet, and will put in the necessary machinery to double its present output.

THE Douglass Furnace plant at Sharpsville, Pa., owned by Pierce, Kelly & Co., consisting of two alternate stacks, has been sold to the Carnegie Steel Co., Ltd., at sheriff's sale, on suit brought by the Farmers' and Mechanics' National Bank, of Sharpsville.

THE Maryland Steel Co. is cleaning up about its blast furnace plant preparatory to putting one stack in blast on foreign ore, the output for several months being taken by Naylor & Co. No other portion of the plant now idle will be started up in the near future.

THE General Electric Co., Schenectady, N. Y., is preparing plans and specifications for a new building 92x350 feet, which will be used for an erecting and testing shop. This building will be of brick and steel construction and will have two wide galleries running its whole length.

THE first product of the York Mfg. Co.'s structural mill at Ironton, Duluth's suburb, two beams, 28 feet long and 18 inches wide, with eight-inch flange, have been shipped for use in supporting the boilers of a Lake Superior saw mill plant. The York mill has facilities for turning out 36-inch beams.

THE two new furnaces under construction at Duquesne by the Carnegie Steel Co. are to have a daily capacity of 500 tons each. They will each be 100 feet high, or 10 feet nigher than the tallest stacks in the Edgar Thomson group. The boshes will be 26 feet or four feet more than the largest diameter of present furnaces.

THE Shickle, Harrison & Howard Iron Co., St. Louis, is preparing plans for an extensive new steel fonndry and cast iron pipe plant to be built on a 50 acre tract at Clifton Heights. The main foundry will be adapted to the manufacture of car couplers, car bolsters and steel motor gears. The iron foundry will have three pits and cast iron pipe will be made, from 60 inches down. A large and well equipped machine shop will be built.

THE Berlin Iron Bridge Co., of East Berlin, Conn., has just completed for the Geo. W. Stafford Mfg. Co., Providence, R. I., a new machine shop 50 feet wide and 174 feet long, two stories high. The building is constructed of brick and iron and is so designed that two additional stories may be added later. The same company has also just completed a new car barn 86x388 feet for the New Haven Street Railway Co.

THE strike at the South Tenth street mill of the Oliver Iron and Steel Co., at Pittsburg, in progress for nearly four months, has been declared off by the men. As the mill has been making full time with new men, there is no work for the strikers at the present time. They may be given employment later. They have been out for the sole object of securing the acceptance of the Amalgamated Association scale and the recognition of that organization. The management is paying scale prices, but refused to treat with the men on any other basis than as individuals.

THE Tabor Mfg. Co., of New York, builder of automatic molding machines, has recently been reorganized, with the following officers: Harris Tabor, president; Angus Sinclair, vice-president; E. H. Munford, secretary and treasurer. The office is at 39 Cortlandt street, New York. The Tabor moulding machine has been proving its adaptability to a constantly widening range of work, and its manufacturers have been more and more successful in the past year in enlisting the interests of foundrymen. Two additional new engines have just been started by the Shelby Steel Tube Co., of Shelby, O. The company is now working on the last three-story building, and when this is complete will have nine engines in operation, with all modern improvements. It will then be the largest tube manufacturer in the world, having a capacity of 61 benches, and a product from 1,500,000 to 2,000,000 feet per month.

The Joke Didn't Work.

The repair crew had it "in" for the new man. "Say, Bill," said one of them, "how many pounds of wire does it take to string up a horse by the tail to——" and as Bill went down into his pocket and brought out the "Practical Application of Dynamo Electrical Machinery," they knew the fun was all over with. The table on wire and other valuable points ought to put this book into the pockets of every man connected in any way with the subject of electricity. It is published by Laird & Lee, Chicago. See advertisment on this page.

Excursion Rates to Atlanta.

On account of the Atlanta Exposition, the B. & O. R. R. Co. will sell excursion tickets at greatly reduced rates. Season tickets will be sold every day until December 15th, good returning until January 7, 1896. Twenty-day tickets will be sold every day until December 15th, good returning for twenty days from date of sale. Ten-days tickets will be sold Tuesday and Thursday each week until December 24th, good returning for ten days from date of sale. The rates from Washington will be $26.25 for season, $19.25 for twenty-day, and $14 00 for ten-day tickets.

Correspondingly low rates from other points on the line.

THE INVENTIVE AGE can recommend the "Climax" watch, advertised in another column, as being, undoubtedly, the best stem-winder watch for the price in the market. It is a good time keeper, and either a plain or imitation engraved cases can be had. This watch is fully timed and regulated and fully guaranteed for one year, the same as Waltham or Elgin.

INVENTIVE AGE BUILDING.

PREMIUMS TO SUBSCRIBERS.

Read the following offers to new subscribers:

OUR $1 OFFER.

THE INVENTIVE AGE one year and two copies of any patent desired, or one copy of any two patents..... $1 00

THE INVENTIVE AGE one year and a list of 50 firms who manufacture and sell patented articles..... 1 00

THE INVENTIVE AGE one year and Altograph map of the City of Washington 1 00

THE INVENTIVE AGE one year and a five line (35 words), advertisement in our "Patents For Sale," or "Want" column, three times..... 1 00

For $1.

THE INVENTIVE AGE and any one of the following Scientific books:

How to Make Electric Batteries at Home, fully illustrated, by Edward Trevert.

Everybody's Handbook of Electricity, illustrated, by Trevert.

How to Make a Dynamo, by Trevert.

Practical Directions for Electric Bell Fitting and Electric Gas Lighting, by Trevert.

Elihu Thompson's What is Electricity?

OUR $1.35 OFFER.

THE INVENTIVE AGE one year and Joseph Allen Minturn's famous book "The Inventor's Friend," indorsed by such high authorities, as Dr. Gatling, Clem Studebaker and others,.....$1.35
Book alone 50 cents.

THE INVENTIVE AGE one year and any one of the popular and instructive books as per offer in another column, under heading of "Popular Scientific Books,".....$1.35

THE INVENTIVE AGE one year and any one of the "Excelsior Edition of Standard Poets," mentioned elsewhere in this magazine,.....$1.35

THE INVENTIVE AGE one year and a copy of "Picturesque Washington," 260 pp., 136 illustrations, Stilson Hutchins' famous book, former price $2, sent to any address in the United States..... $1 35

THE INVENTIVE AGE one year and The Peoples' Atlas of the World, one of greatest bargains ever heard of; size of Atlas 14 x 22 open; latest maps and statistics; handsomely illustrated, a $2 book with AGE one year—both for.... $1 35

☞ See another column for other offers.

OUR $1.50 OFFER.

THE INVENTIVE AGE one year and Robt. Grimshaw's famous book "Tips to Inventors"..... $1 50

Address all communications to
THE INVENTIVE AGE,
Washington, D. C.

Cantwell & Company, Patent Agents, Calcutta, India.

We have received from this well-known and long established firm in the east their handy little phamphlet which deals fully with the laws and regulations appertaining to the taking out of Patents and registering of Trade Marks in India and other Eastern countries. It will be found a very useful adjunct to the file of Patent Agents in this country and more so to those in this city, the headquarters of the fraternity. The manual contains a list of charges which we think are very moderate, and, which will we feel sure fill a long felt want in that direction.

A junior member and representative of the firm, Mr. Harry Cantwell, is at present in this city which he proposes to make a permanent residence.

All communications to him with reference to any information regarding Patent Practice in the East may be directed in care of the Inventive Age office, Washington. We may add that the above firm are the sole agents for the "Inventive Age" in India, British Burmah and Ceylon.

Want a Fountain Pen?

One of the very best in the market, a standard article, warranted, will be sent as a premium with THE INVENTIVE AGE. The retail price of the pen is $2.75. We will sendthe AGE one year and the pen for $2.75.

SUPPLEMENT.--Tips to Inventors.

The Infancy of Invention.

As capital is constantly being invested and expended to protect and preserve capital previously expended and invested in various enterprises all over the land, so will inventions continue—their variety and multiplicity being demanded to further the usefulness and perfection of inventions previously originated.

It was Edison who, replying to the question, "Do you think that the inventions of the next fifty years will be equal to those of the last?" said: "I see no reason why they should not. It seems to me that we are at the beginning of inventions." The truth of this prediction is illustrated in the many useful and wonderful achievements of Mr. Edison's own laboratory since giving utterance to this statement only a short time ago.

Profits from Invention.

The value of an invention is determined by no fixed rule. Fabulous sums have been made from simple and novel, as well as complex and useful, inventions. It is a fact that four-fifths of the business of the United States is transacted by the use of inventions. The benefits to mankind because of inventions, are so manifest and so common we are apt to look upon them in a matter-of-fact sort of way and fail to give the inventor the credit due him. In the majority of cases, however, the failure of an inventor to reap a reward is attributable to his own negligence, lack of forethought and indiscretion.

Nearly every human being is an inventor, but only a few obtain a *monopoly*—a patent—on the product of their brain. There are thousands of really useful articles, appliances and discoveries, in use every day by millions in all walks of life, that might have been patented had the inventor possessed the business sagacity that has actuated his more fortunate neighbor. Take for instance the open slot necessarily used in all conduit electric, or cable street railway systems. The inventor failed to get a patent on the idea and a fortune missed him.

There is money in inventions, but not always for the inventor.

The only way to make money out of an invention is through the protection afforded by a patent; not a patent in name only, but a *good patent*—one that is intelligently drawn, with claims commensurate with the scope and importance of the invention.

The profits arising from inventions in the electric field during the past twelve years have been simply astounding. In railway appliances, bicycles, typewriters, telephones, cash registers, slot machines and farm machinery, the field has been equally remunerative. And just think of that simple toy "Pigs in the Clover"—it netted the inventor, whose friends laughed at him for obtaining a patent on so simple a toy, over $150,000. The inventor of the metal plates to be attached to the worn heels of shoes (for sale in all cities) realized a fortune out of it amounting, it is said, to nearly $1,000,000. Perforated wooden seats for chairs and rubber tips for lead pencils brought the inventors big results. Howe made a million dollars from his sewing machine attachments, and the inventor of that simple lamp attachment, the inverted glass bell, to be suspended over lamps to protect the ceilings from being blackened, made the inventor rich. The "Darning Weaver," a device for repairing stockings, is a useful invention and is netting the inventor a handsome revenue on royalties. The wire nail and gimlet-pointed screw are fortune makers, and wire nails caused the invention of automatic machinery that manufacturers them so cheaply it does not now pay the carpenter to spend his time in picking a nail up when it drops, if it requires ten seconds to do so. The inventor of the well-known "safety pin" lived in luxury all his life, after discovering a means of concealing the point of a pin in such manner as to prevent scratching. The inventor of roller skates made nearly a million and the inventor of the needle-threader for a long time made $10,000 a year.

Relation of Capital to Invention.

Mr. Edward P. Thompson, one of the most entertaining writers on the subject of invention, says that "every invention, before the introduction into practical use, passes through two stages; namely, mental and physical"—mental when in the mind of the inventor only, and physical when the mental invention is put into bodily form by hand, or by hand with the assistance of a convenient tool. "A mental invention," says the writer, "sometimes does not become a physical invention because the inventor lacks money, technical knowledge or diligence. Such a mental invention often becomes a physical invention by the assistance of a capitalist, an educated person, or diligent companion." This being true the *mental* inventor, the person who, for lack of means possibly, would fail to make his invention a physical reality—such a person should take into his confidence a friend or companion to share the prospective benefits of his invention. Thousands of meritorious mental inventions are never worked out because of the over-timidity of the inventor, his exagerated greed for *all* the benefits to accrue instead of half the loaf, which in many instances is, or would have been, ample reward. Mr. Thompson truly says: "Inventors and capitalists should be more willing to co-operate. It is too often the case that the former must pay for his own experiments and all patent costs before a capitalist will even take the trouble to look into the merits of the alleged invention. On the other hand it is too often true that the capitalist seeks to join with the inventor, but the latter wants too high a price at the beginning."

Who Can Apply for Patents.

Patents are issued to any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or new and useful improvement thereof, not known or used by others in this country, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned; and by any person who, by his own industry, genius, efforts and expense has invented and produced any new and original design for a manufacture; any new and original design for the printing of fabrics; any new and original impression, ornament, pattern, print or picture to be printed, painted, cast, or otherwise placed on or marked into any article of manufacture, or any new, useful and original shape or configuration of any article of manufacture, the same not having been known or used by others before his invention or production thereof, nor patented or described in any printed publication, upon payment of the fees required by law and other due proceedings had.

If it appears that the inventor, at the time of making his application, believed himself to be the first inventor or discoverer, a patent will not be refused on account of the invention or discovery, or any part thereof, having been known or used in any foreign country before his invention or discovery thereof, if it had not been before patented or described in any printed publication.

Joint inventors are entitled to a joint patent; neither can claim one separately. Independent inventors of distinct and independent improvements in the same machine can not obtain a joint patent for their separate inventions; nor does the fact that one furnishes the capital and another makes the invention entitle them to make application as joint inventors, but in such case they may become joint patentees. The receipt of letters patent from a foreign government will not prevent the inventor from obtaining a patent in the United States, unless the invention shall have been introduced into public use in the United States more than two years prior to the application. But every patent granted for an invention which has been previously patented by the same inventor in a foreign country will be so limited as to expire at the same time with the foreign patent, or, if there be more than one, at the same time with the one having the shortest unexpired term, but in no case will it be in force more than seventeen years.

Protection to Inventors.

What is a patent? It is a monopoly or grant, in the United States, for a term of seventeen years, to the patentee, his heirs or assigns, of the exclusive right to make, use and vend the discovery throughout the United States, as the inventor's rights may appear in the specifications and patent granted.

This means a great deal to the inventor who has secured a *valid* patent containing all the claims so worded as to prevent infringement and loss in contest. Thousands of inventors, obtaining patents through unreliable and inefficient attorneys or agents, find themselves possessed of patents *in name only*, and of no value when combatted by infringers with capital and the aid of able legal talent. A good patent costs no more than a weak and worthless one. Therefore how shortsighted are those inventors who employ cheap attorneys, saving $5 or $10 in fees, only to find themselves loosers of *all* they have paid when the contest comes.

The Need of Reliable Attorneys.

The Revised Statutes of the United States provide that "before any inventor shall receive a patent for his invention, he shall make application therefor in writing to the Commissioner of Patents, and shall file in the Patent Office a written description * * * of the same in such full, clear, concise and exact terms, as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct and use the same; and in case of a machine, he shall explain the principle thereof and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions."

To carry out these provisions it is necessary for the inventor to first make a clear, concise and complete drawing, or a working model of his invention or discovery, and send it to THE INVENTIVE AGE, or some thoroughly reliable attorney, who, before making application for the patent, should make a thorough and rigid examination of the Patent Office to determine upon its novelty or patentability. If the invention has been anticipated by some one else, or if it lacks novelty, or if for any reason a patent can not be granted, or, if granted, would be of no worth or value, then the inventor does not want to incur the expense of making application and paying attorney's fees and government fees. For making this thorough examination THE INVENTIVE AGE and all reliable attorneys charge $5, which fee is, under some circumstances, however, taken out of the additional fees paid by the inventor in case letters patent are applied for. The fees of patent attorneys vary somewhat, but the average fees for obtaining a United States patent are about $65—the government fees being $15 on filing the application and $20 on issuing a patent—the balance being the fees for preparing specifications, making searches, etc. The inventor is sometimes favored in terms given for payment of the fees, more detailed information regarding which can be obtained by enclosing a 2-cent stamp with enquiry to THE INVENTIVE AGE, Washington, D. C. The reason why the inventor should have a preliminary examination of the Patent Office made before applying for a patent lies in the fact that if the case is rejected the fees paid to the government and the attorney are lost

All patents obtained through us will receive special mention in THE INVENTIVE AGE and in cases of unusual merit inventions will be illustrated free of charge to our clients.

This publication, reaching capitalists, manufacturers and business men throughout the world, is of value in assisting to bring an invention before the public in case its promotion or sale is desired by the patentee.

And What Do You Think of This?

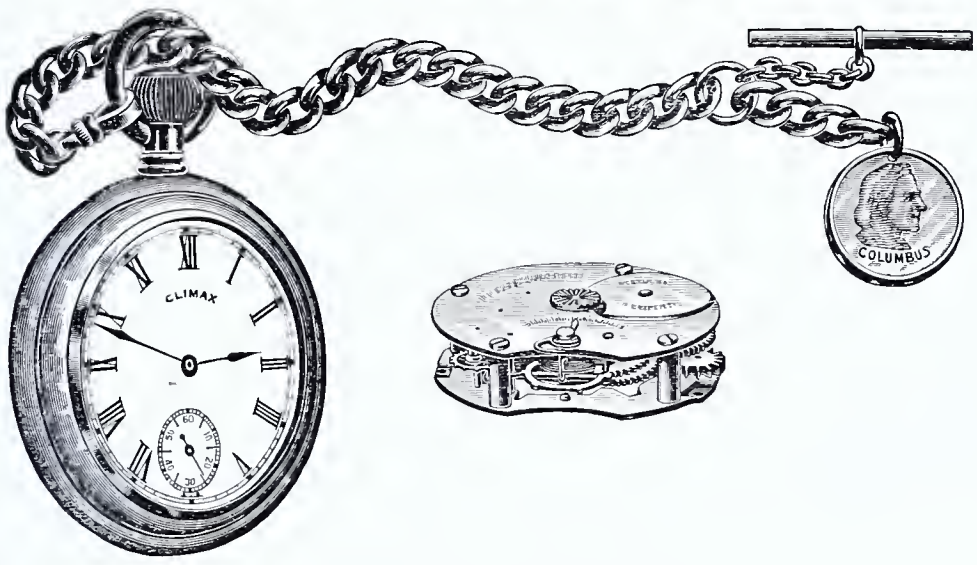
JUST OUT! BRAND NEW! ENTIRELY ORIGINAL!

$2. An American Stem-Winder.

A DUPLICATE IN QUALITY, APPEARANCE SIZE, ETC., OF ANY AMERICAN WATCH SOLD FOR LESS THAN $10.00

Our Watches are Positively and Unequivocally Guaranteed.

THE CLIMAX



EITHER ARABIC OR ROMAN DIAL.

This is the CLIMAX up to date. It represents the most important step taken in Watch evolution in many years. It describes a line beyond which nothing radical will pass for years, not only in the matter of PRICE, but QUALITY. The movement comprises many original patented features, and has been for years the subject of constant labor by one of the foremost of the foremost of expert and inventors.

DESCRIPTION.

CASES.—Two Styles, Plain and Imitation Engraved. Two Finishes, Solid Gilt and Nickel. Two Dials, Roman and Arabic. Snap Back. Heavy Bevel Crystal. Regular Stem Wind. Inside Stem Set. Regular 18 size Case. Chains assorted in each dozen.

MOVEMENT.—Regular American Lever, Lantern Pinion, Quick Train, 240 Beats per Minute Three-quarter Plate, Short Wind, Runs 30 hours to one winding. Dust Cap over Movement.

Fully Timed and Regulated, and FULLY GUARANTEED for one year, the same as Waltham or Elgin.

The Cheapest Stem-Winding Watch Ever Produced.

PRICE $2. With "THE INVENTIVE AGE" one year, $2.50.

JUST PUBLISHED.

How to Build a One-Fourth Horse-Power Motor or Dynamo.

By A. E. WATSON.

Illustrated with full working drawings.

PRICE, PAPER, 25 CTS. CLOTH, 50 CTS.

Address "INVENTIVE AGE," Washington, D. C.

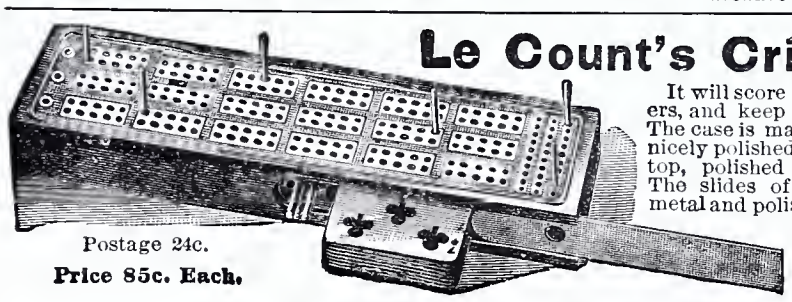
THE STAR FOUNTAIN PEN.

A solid 14 karat gold pen in highly finished hard rubber holder. The only fountain pen that will give perfect satisfaction, sold at less than $2.50. We warrant it in every particular and refund money when it is not satisfactory. A gold pen alone of the same value costs in any retail store more than we charge for the whole outfit. Writes 25 pages fools cap to one filling.

By mail, **$1.50** each; **$12** per dozen.

With "Inventive Age" one year, $2.

Le Count's Cribbage.

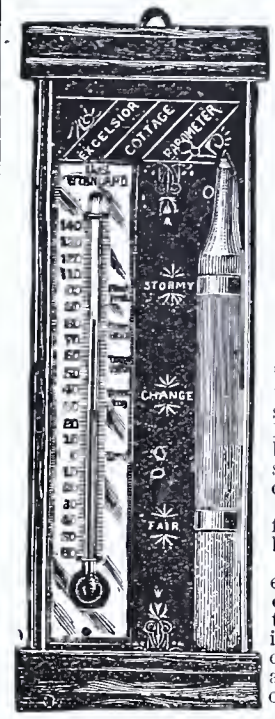


It will score for three or six players, and keep tally of the games. The case is made of black walnut, nicely polished; has a solid metal top, polished and nickel plated. The slides of compartments are metal and polished. This Board is superior to Boards that sell for three times the price. Full directions with each Board.

Postage 24c.

Price 85c. Each.

With "Inventive Age" one year, $1.60.



THERMOMETER & BAROMETER COMBINATION.

Combination Barometer and Thermometer.—Our well known leader. Blue and Gilt back with metal side posts. Fancy top and bottom and handsome enough to decorate the home of a millionaire. Extra well made and dependable on for showing changes in both weather and temperature. One of the biggest bargains in our list. A handsome thermometer, together with a glass tube containing a chemical preparation which rises and falls by action of the atmosphere, foretelling correctly all changes in the weather. This is a new style storm glass and the most reliable ever known, being in use in all signal service stations. The slightest change in the atmosphere in some way affects this glass. The thermometer is also of the best quality. Both are enclosed in a stand with walnut top and bottom and blue and gilt back. On either side is also a strong metal bar giving the whole great strength and adding to its appearance. Altogether it is a most remarkable combination for the price and we take pleasure in offering it to our patrons

This is not one of the many cheap combinations of which the market is flooded which are neither good for ornament or use and can never be relied upon to forecast either the weather or in fact any thing else.

There is no reason for you to depend on the weather Bureau reports as every person who owns one of our Combinations, can make his or her forecast and tell exactly when it will be fine, rainy and in fact every change in the weather. With this you can tell whether to put on rubbers and a mackintosh or a pair of summer shoes and a costly dress. Don't take any more chances about the weather but be prepared. Each one packed securely in a neat box so that they can be mailed up without any fear of getting broken or damaged. Postage 10c. **Price 32c. Each; $3.00 Doz.**

With "Inventive Age" one year $1.25.

THE DOLLAR TYPEWRITER.

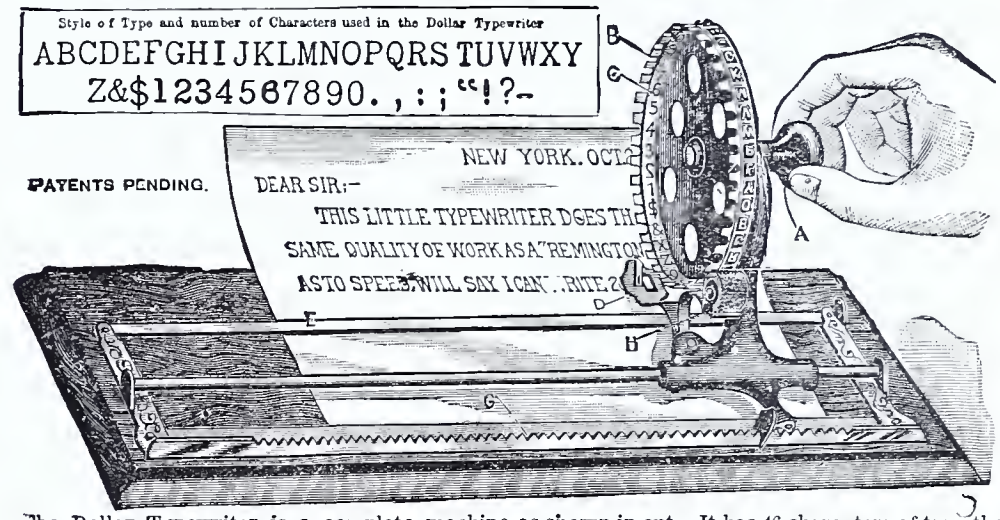
A PERFECT TYPEWRITING MACHINE.

Price only $1.00 by Express; $1.15 by Mail.

Style of Type and number of Characters used in the Dollar Typewriter

ABCDEFGHIJKLMNOPQRSTUVWXY
Z&$1234567890.,:;"!?-

PATENTS PENDING.

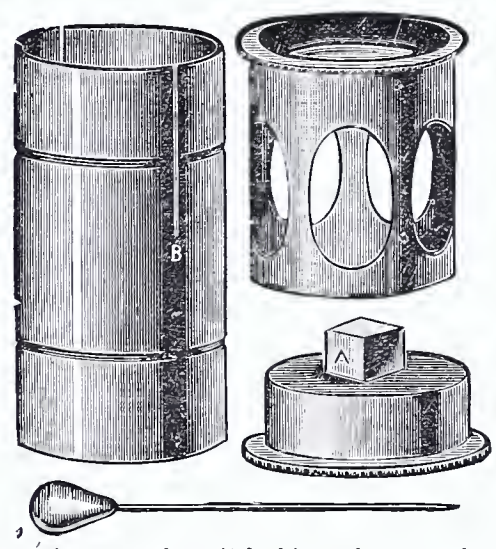


The Dollar Typewriter is a complete machine as shown in cut. It has 46 characters of type the same as that used on a Remington. It is provided with numerous patented devices for inking the type, holding the paper, spacing and governing the impression and allignment. It will write a postal card, note or full letter sheet and is particularly well adapted to addressing envelopes. It is a practical illustration of what a rare combination of ingenuity, skill and capital may do as it embodies many difficult and expensive mechanical movements which were heretofore only possible in high price machines. Over a **QUARTER MILLION** of these machines have been sold within the last year and the secret of its great success is that the manufacturers commenced with a foundation of original ideas and then spared no expense in putting them to practice by the use of the best machinery to be devised. If no more could be said of it this Typewriter is worth many times its cost as an instructor of children teaching and amusing at the same time, but its features of practicability commend it to the use of nearly everyone and the sale it has had and will have is not surprising. It **IS A PERFECTLY CONSTRUCTED** machine that will do work equal in quality to any of the high priced machines. It is so **SIMPLE** that a **CHILD CAN OPERATE IT** and will not get out of order. It is **LIGHT** and **PORTABLE**—just the thing for travelers. It is very **ATTRACTIVE** in appearance, made entirely of metal, mounted on a highly polished hard wood base. It will **WRITE RAPIDLY** with practice—15 to 25 words a minute. We **GUARANTEE** every claim for it, and if not as represented **REFUND MONEY.** The **PRICE** is but **ONE DOLLAR!** This is the age of typewriters, and no one should be without one.

Any typewriting that may be done with any of the high priced machines, from $100.00 down may be done with this one. It is now possible for **EVERYONE** to own a Typewriter and address and write their letters, postals, etc., in the same way the richest firms do theirs. The monopoly in Typewriters died when **"THE DOLLAR"** was born. Postage 15c. **Price $1.00 Each.**

With "Inventive Age" one year, $1.75.

COMBINATION MICROSCOPE.



Scientific skill and the greatest perfection in workmanship coupled with a very high magnifying power, distinguish this handsome microscope over all others ever offered at popular prices. It is specially imported from France, and readily sells for one dollar at retail. As regards power and convenience of handling, good judges pronounce it the best ever introduced for popular use. The cylindrical case is manufactured from highly polished brass, while there are two separate lenses—one at each end of the microscope. The larger glass is a convex magnifier, adopted for examining insects of various kinds, the surface of the skin, the hair, fur or any small articles. It will magnify the hairs on the hands or arms till they resemble large ropes, and it is a most interesting companion. The other lens is exceedingly powerful, and will clearly delineate every small object, entirely invisible to the naked eye such as the animalcules in a drop of water, fishes, feathers and the minutest insects. An interesting illustration of its great power may be had by placing a drop of sour flour paste upon the bottom of the lens, when on looking through the eye-piece, the sight of the writhing mass of thousands of worms, snakes and eels, is one never to be forgotten. Thousands of living animalcules can be seen in a single drop of stagnant water. An insects eye is a very beautiful object when seen through this microscope. It reveals hundreds of small eyes or six sided facets resembling net work or honeycomb, which enables the insect to see in all directions without moving its head. There are 4,000 of these little eyes in the single eye of a fly. It is invaluable in detecting adulterations in food, such as flour, tea, coffee, sugar, spices, milk and the fatal trichina spiralis or pork worm. Postage 3c. **Price 47c. Each.**

With "Inventive Age" one year, $1.35.

$1,000 REWARD

To every inventor taking out a patent through our office. For particulars and a 79 page excellent hand-book for inventors, inclose stamps and address **The American Patent Market and Novelty Works,** ST. PAUL, MINN

Mention this paper. A. M. CARLSEN, Prop.

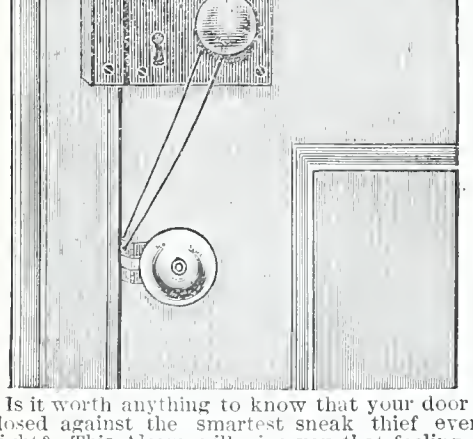
PATENTS.

For eleven years I have devoted my time exclusively to the preparation and prosecution of applications for PATENTS, TRADE-MARKS and COPYRIGHTS, to the management of interferences, to rendering opinions as to scope and validity of patents, to making preliminary searches, and to attending to all matters relating to patents or inventions. Highest references in all parts of the country. Send for hand-book on patents.

RHESA G. DuBOIS,

Inventive Age Building. WASHINGTON, D. C.

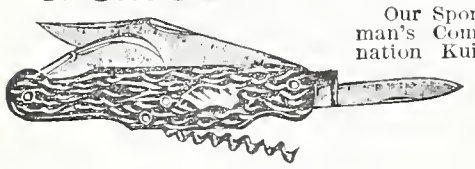
BURGLAR ALARM.



Is it worth anything to know that your door is closed against the smartest sneak thief every night? This Alarm will give you that feeling of security. He may pick or break the lock, but he don't open the door without setting off the Alarm. Its simplicity accounts for its low price and its value. It winds like an Alarm Clock and is closed into any doorjam without injury to woodwork. When the door opens it drops, suspended by string, and goes off with loud ring. Postage 5c. **Price 68c. Each. $7.20 Doz.**

With "Inventive Age" one year, $1.50.

SPORTSMAN'S KNIFE.

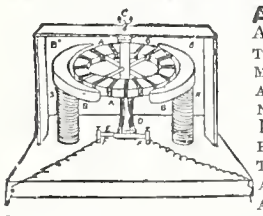


Our Sportsman's Combination Knife.

Genuine heavy stag handle with three blades, one large clip blade, one medium, one short and one curved, all in finest crocus polish, also has corkscrew, milled scales, brass lined, German Silver shield, one of the handsomest and most durable knife we have ever offered. Postage 5c. **Price 95c.**

With "Inventive Age" one year, $1.40.

ELECTRO MOTORS; HOW MADE AND HOW USED.



A HANDBOOK FOR AMATEURS AND PRACTICAL MEN BY S. R. BOTTONE AUTHOR OF "THE DYNAMO," "ELECTRICAL INSTRUMENT MAKING FOR AMATEURS," "ELECTRIC BELLS," ETC., ETC. AND A. M. A. BEALE, AUTHOR OF BEALE'S CALISTHENICS, ETC.—A complete and simple explanation of the source of the power in a dynamo and the method of applying the same, commencing with a Simple Motor, and proceeding to an exposition of the Siemen's, Thompson's, Walker's, Grison and other motors.

In addition three special chapters by an American author follow in which the information embraces all American improvements. The work is probably the most complete and easily understood of any of the many now in the field

180 PAGES, CLOTH, PRICE.....**75 cts.**

With "Inventive Age" one year, $1.50.

Just Published.

Standard Electrical Dictionary,

By Prof. T. O'CONOR SLOANE,

Author of "Arithmetic of Electricity," Electricity Simplified," Electric Toy Making," Etc.

624 Pages. 350 Illustrations. Handsomely Bound in Cloth, 8vo, Extra Super Calendered Paper, **$3.00.**

The large sales of the author's previous works, and the flattering reviews they have received from all sources, together with the great demand for a Dictionary of this kind, have led Prof. Sloane to complete, after a vast amount of labor, a work of a very high standard.

In publishing the "Standard Electrical Dictionary," we have adhered to what the work purports to be, exhausting the subject of electrical terms, giving each title the clearness of explanation necessary to make the understanding of it complete, without unnecessary elaboration. In this work, every electrical word, term, or phrase will be found intelligently defined.

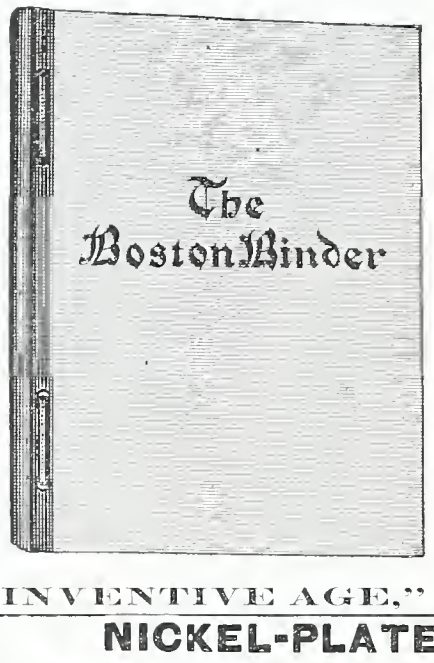
The work is absolutely indispensable to all in any way interested in "Electric Science," from the higher electrical expert to the everyday electrical workman. In fact, it should be in the possession of all who desire to keep abreast with the progress of the greatest science of the times.

PREPAID TO ANY ADDRESS ON RECEIPT OF $3.00.

Address,
THE INVENTIVE AGE,
Washington, D. C.

Bind "The Inventive Age."

It is the best binder ever invented. It takes only half a minute to insert the paper, and thereafter it is kept clean, and can always be found when wanted. A single binder will hold an entire year's issues of the AGE. When it is complete it can be filed away in your library as a most valuable book of reference for the year 1895.



The Binder is very inexpensive. We send it postpaid on receipt of only **thirty cents,** cash or stamps. It makes all the difference between lost, torn, and dirtied papers, scattered about the house in such confusion that you can never find what you require, and a handsome orderly file which becomes at the end of the year a volume for your library certainly worth from $1 to $3.

To insure a copy of the new Boston Binder to every one of our subscribers, we make the following liberal offer:

FIRST. On receipt of fifteen cents with your renewal to pay for postage, packing, etc., we will send the Boston Binder **free.**

SECOND. To any old subscriber who sends us **one new subscription,** we will send the Binder **free of charge.**

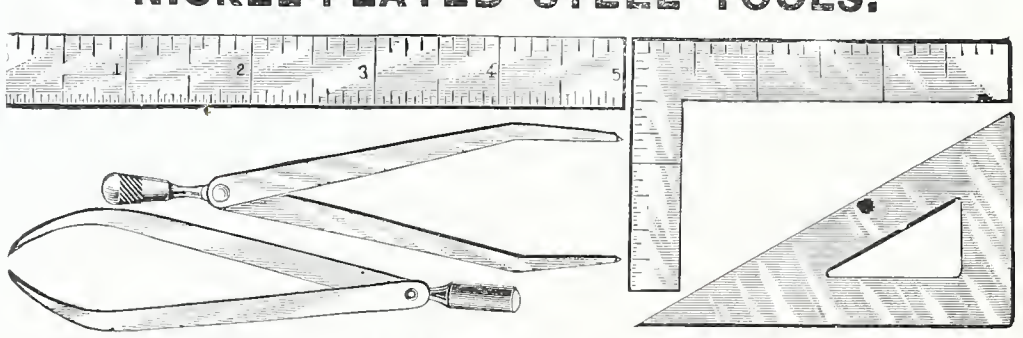
THIRD. Any old subscriber who renews his subscription and sends us **two new subscriptions,** we will send a Binder **free** to each party.

These are very generous offers, put we want every reader of the AGE to preserve his paper, and we are willing to contribute a little ourselves toward this end.

Send your orders in at once for the new Binder.

"INVENTIVE AGE," Washington, D. C.

NICKEL-PLATED STEEL TOOLS.



These articles are made of the finest steel, polished and plated in the best possible manner and are for all practical purposes equal to similar goods sold in stores at five times the price. The well known high prices of such goods, has induced us to manufacture them in large quantities and to furnish them at prices at which every one can afford to buy. They are useful in the household and indispensable in every office and store. In fact no one should be without them.

By mail, **15** cents each; **$1.20** per dozen. Set of 5, **60** cents.

With "Inventive Age" one year, $1.

The Norris Peters Company,

Photo-Lithographers,

458-460 Penn. Avenue, Washington, D. C.

Special attention given to the reproduction and printing of copies on parchment, drawing-paper, tracing-linen, and cardboard, of Patent Office drawings for attorneys to accompany application for patents in foreign countries.

THE AMERICAN PRESS CLIPPING CO.

District Title Building, Washington, D. C.

Please send till further orders, newspaper clippings about myself and on the fottowing subjects:

.....

.....

For which I agree to pay monthty as foltows: $1 a month for 25 (or tess) clippings; 4 cts. each up to 200 in a month, and 3 cts. each for all over that number, a month.

Name.....

Address.....

C. J. STOCKMAN, Inventive Age B'ld'g, Washington, D. C.

F. E. WELCH. 20 Kimball House, Atlanta, Ga.

STOCKMAN & WELCH,

EXPERTS IN PATENTS,

All work attended to promptly and faithfully

Correspondence Solicited.

Our clients will have the privlege of placing a model of their inveniion on exhibition in our section in the Atlanta Exposition to be held in 1895, without cost to them.

Washington, D. C.

Atlanta, Ga.

PATENTS OBTAINED.

E. W. ANDERSON & CO.,

Counsellors at Law,

700 7th Street, WASHINGTON, D. C.

Examinations without charge.
Inventor's Guides free.

GENII OR TALKING BOARD.

This wonderful discovery, based on the mysteri ous powers of human magnetism, answers al questions on any subject, in the most accurate and marvellous manner. How and why it does this we cannot explain; yet when the Board is set between two persons, and their fingers are placed on the little magnetic table, set upon the Board, the little table will soon commence to move, faster and faster, talking or answering questions rapidly, by touching the printed words or letters on the Board It works with surprising speed, and will answe every question on all topics—political, religious o social. It will tell your fortune, guide you i business matters, and inform you as to your futur husband or wife; tell whether you are to be rich live long, etc.

The GENII is a marvel, astonishing all who tr it. It is a handsomely polished Board, covere with words and letters, and with the magneti table, is packed in a strong box. Postage 25c.

Price 60c. Each; $6.00 Doz.

With "Inventive Age" one year, $1.75.

SPRING BALANCE SCALES

Spring Balance. An old favorite. Will weigh anything under 24 pounds. The best quality yet produced. Elegantly finished and accurately made and sealed off. Great value! Postage 6c.

Price 12c. Each; $1.28 Doz.

With "Inventive Age" one year, $1.

WM. DUFFY,

REGISTERED

Plumber and Gas Fitter,

1130 N. CAPITOL ST.,

WASHINGTON, D. C.

ESTIMATES FURNISHED

Orders by mail will receive prompt attention.

D. BALLAUF,

Practical Mechanician,

(Established 1855.)

Constructor of Light Machinery, Experimenta and Model Work.

All orders for Certified Duplicates of Patent Office Models, and Models of any Foreign Patents from Drawings and Specifications, filed in the Library of the Patent Office for law suits in case of infringement; also, Original Models for Inventors, and Models to complete application for Patents, from Drawings and Specifications filed in the Patent Office.

731 7th Street, N. W., WASHINGTON, D. C.

The Inventive Age
AND INDUSTRIAL REVIEW
A JOURNAL OF MANUFACTURING INDUSTRY AND SCIENTIFIC PROGRESS

Sixth Year. No. 11. | WASHINGTON, D. C., NOVEMBER, 1895. | Single Copies 10 Cents. $1 Per Year.

THE CANADIAN SHIP CANAL.

A Wonderful Engineering Triumph, second only to the Welland.

The opening of Sault Ste. Marie Ship Canal, on the Canadian side, which took place on Sept. 9, marks the inauguration of one of the most important public works thus far undertaken in Canada, ranking in its nature only second to the Welland Canal itself. This canal and lock, the location of which will become clear by an inspection of the accompanying map, is designed to carry large sea-going vessels around the 18 foot fall of the "Soo" Rapids, connecting Lake Superior with Lake Huron.

The total length of the new canal across St. Mary's Island is 3,500 feet, and the dredged approaches under water at the two ends are about 18,000 feet long, with a depth of water of about 21 feet. The essential feature of the work is, of course, the lock by which the 18 feet fall of the Sault Ste. Marie is overcome. This lock is built of masonry, and is 900 feet long between quoin posts, and 60 feet wide, with a depth of water of 20¼ feet on the sills at low water. The height of the top of the walls above the floor of the lock chambers is 43¾ feet.

The are five sets of gates, two at the upper or west end, and three at the lower end, that is, a lock and guard gate at each end and an extra or auxiliary lock gate at the lower end for immediate use in case the lower main gate should get injured. Two sets of these gates (the lower main and auxiliary) are 44½ feet in height x 37 feet in width, weighing about 87 tons per leaf. The guard gates are, of course, to be used only when the lock chamber is being pumped out for examination or repairs. Water is admitted to the lock chamber by four 8 x 8 ft. culverts, extending under the breast wall and underneath the floor and having openings at their tops. The inlets and outlets to these culverts are closed by butterfly valves 10½ x 8 feet. area, constructed of steel. Both the valves and gates are operated by electric power.

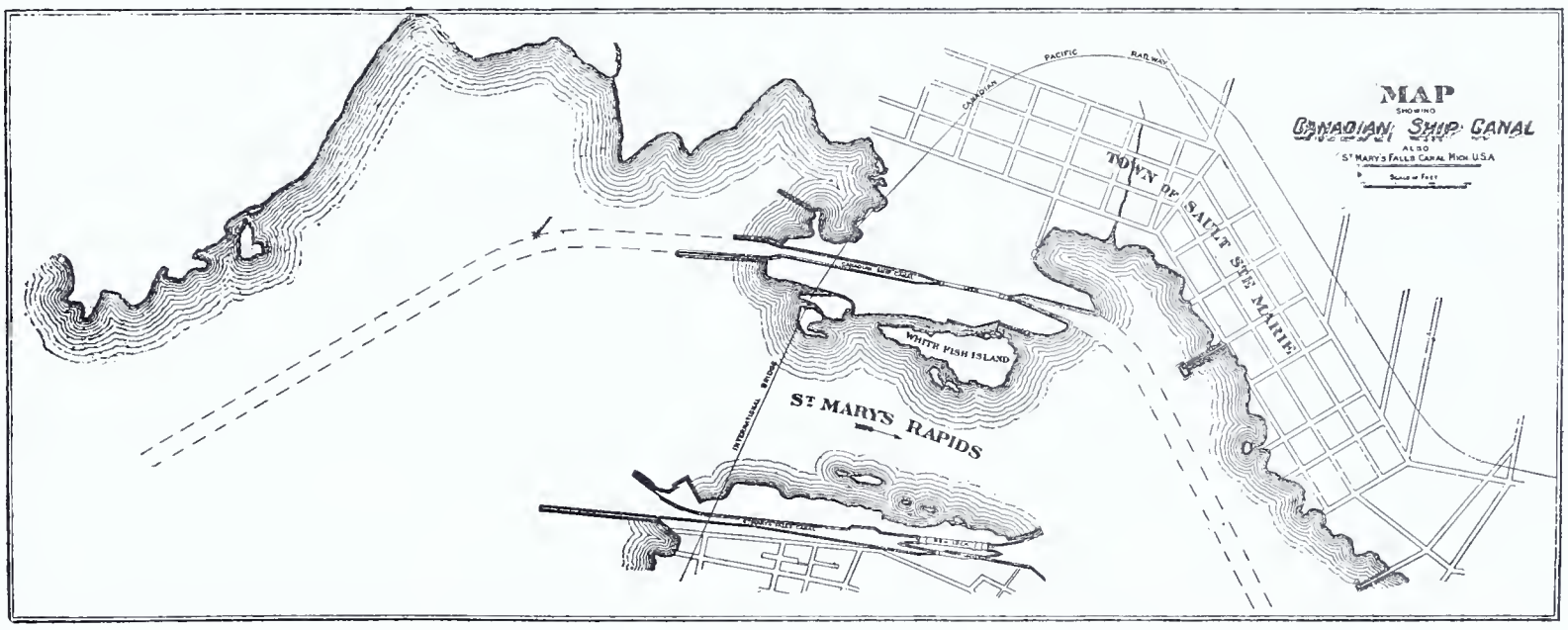
In all there are six gate machines, one for each leaf of the upper lock gate, lower lock gate and auxiliary gate. A one story wooden motor house covers each of the gate machines and its connecting motor. Four of these houses as shown on the plan, are L-shaped, this additional portion being to enclose in the same building the valve machine and its motor.

With this machinery, from actual practice, the time required to pass a vessel through the lock going up stream is, after the vessel has taken her place in the chamber, 50 seconds for closing the lower gates, plus 50 second for opening the valves, plus 7 minutes for filling the lock, plus 50 second for opening the upper gates, or 9½ minutes altogether. As the lock can be emptied in 5 minutes a vessel can be locked down in 7½ minutes.

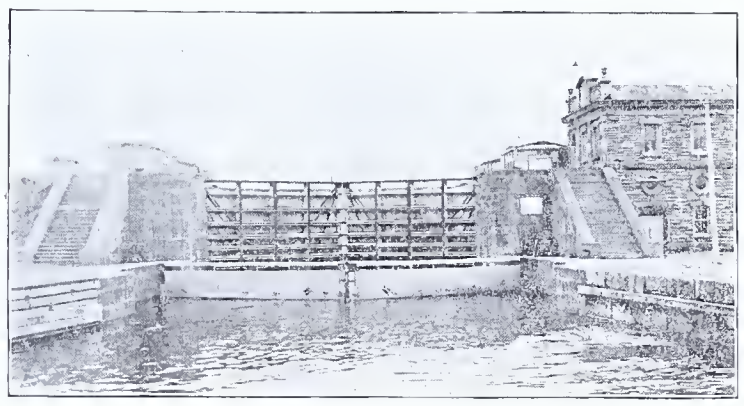
The motors are governed by automatic switches, operated by what may be called cut-off, or adjustable tripping bolts, which push the switch handle over and thereby cut off the current, so that the cross heads will not go beyond the intended point.

The tripping bolts (which push the handles) are adjustable in a slot by a nut and a washer on the back of the plate, so as to make them cut off sooner or later, or to the point required. These tripping bolts are

Continued on page 171.)



MAP SHOWING CANADIAN SHIP CANAL, AND ST. MARY'S FALLS CANAL, MICH.



LOWER GATES AND POWER HOUSE.

THE LOCK FROM WESTERN END.

The Inventive Age

Established 1889.

INVENTIVE AGE PUBLISHING CO.,

8th and H Sts., Washington, D. C.

ALEX. S. CAPEHART. MARSHALL H. JEWELL.

The INVENTIVE AGE is sent, postage prepaid, to any address in the United States, Canada or Mexico for $1 a year; to any other country, postage prepaid, $1.50.

Correspondence with inventors, mechanics, manufacturers, scientists and others is invited. The columns of this journal are open for the discussion of such subjects as are of general interest to its readers.

Technical matter is particularly desired. We want practical information from practical men.

Nothing will be published in the editorial columns for pay.

The INVENTIVE AGE is thoroughly independent.

Advertising rates made known on application. Special facilities for furnishing cuts of any patented article together with descriptive article. Business specials 25 cents a line each insertion, 7 words to the line. No advertisement less than 50 cents.

Address all communications to THE INVENTIVE AGE, Washington, D. C.

Entered at the Postoffice in Washington as second-class matter.

WASHINGTON, D. C., NOVEMBER, 1895.

GEN. O. M. Poe, well known United States engineer died in Detroit last month. He served through the rebellion with great credit and at the time of his death was in charge of the great Soo and lake improvements.

There is a clause in the New Zealand Local Option Bill providing that every man convicted of being an habitual drunkard shall be photographed at his own expense, every publican in the district in which he lives supplied with a copy.

THE use of compressed air for street car compulsion is likely to be utilized in Richmond. Va. It is said that John C. Calhoun, of New York, has secured contract of the Popp system and his faith in the enterprise is strengthened by the success of this system in Paris.

THE most voluminous patent ever awarded was sent out from the patent office last month. This patent was granted to James W. Paige of Hartford, Conn., for a machine for distributing, setting and justifying type. It took 163 sheets, containing 471 drawings, and 55 sheets of long primer to describe this patent. There were 146 claims for it allowed. Strange as it may seem the whole machine weighed but three pounds.

THE managers of the Atlanta Exposition have repeated the blunder of the Chicago fair in the matter of granting exclusive photographic privileges. In doing this the management deprives the enterprise of much valuable and free advertising. It ought to be apparent to the exposition people that such an event cannot be too widely advertised and that illustrations are worth columns of write-ups. Illustrated magazines are not likely to relish a censorship on its illustrations of the Atlanta exposition by a photographic company, enjoying exclusive rights and priveleges.

THE first of the new type of heavy locomotives for high speed on the Burlington road has been delivered. The maximum steam pressure of the boiler is 200 pounds to the square inch. The steam cylinders are 19x26 inches. The tank has a capacity of 4,000 gallons, while the tank capacity of a Class H engine is 3,500 gallons. The total weight is 138,000 pounds. The height of the smokestack is but fourteen inches. A man could carry the stack under his arm, whereas a few years ago a locomotive stack could be moved only by the aid of a derrick.

THE United States Circuit Court holds (Tripp, etc. v. Rogers, 61 Fed., 289) that invention often lies in the direction of making a machine more automatic. By automatic is meant self-acting, or the limination of human agency or volition, which results in the saving of labor and increased certainty and uniformity of operation. This is the sense in which the term is used in the mechanical arts and in the patent law. But it does not include all contrivances which are operative for the purposes designed under any applied force, whether muscular or otherwise, as, for example, a wheelbarrow and hand press.

THE attendance at the Atlanta exposition is increasing and the management have reason to feel proud of the success attained. No former event of the kind has so interested the people of the south and brought together so many evidences of the boundless resources of this section. Whether through prejudice or lack of enterprise the fact remains that in the World's Fair at Chicago, the south was not very well represented. Doubtless an appreciation of this fact has had a stimulating effect and in the Atlanta event it is proposed to place this region in a different light before the world.

AT last an inventor, Horace Holbrook, of Coupeville, Washington, has come forward with a scheme calculated to make countless thousands, who have occasion to ride on railway trains, happy. There are two inventions needed to make the traveling public comfortable. One is a device for raising and lowering windows and the other is a means of satisfactory ventilation. The Washington inventor would solve the first problem by a pneumatic device operated by air pressure from the air brake pipes. At each window is a piston fitted to slide in a cylinder and having its piston rod connected with the window sash, while pipes from the air brake system connect with the upper and lower ends of the cylinder on opposite sides of the piston, and a valve controls the admission of air to either end of the cylinder to force the window up or down.

THE Financial and Commercial Chronicle of New York, publishes a carefully prepared table of crop statistics in which it is estimated that the world's production of corn in 1885 was 2,372,254,000 bushels; wheat, 423,475,000 bushels; and oats, 825,494,000; a total of 3,621,223,000 bushels.

This is an increase of 1,300 million bushels over 1884; 1,000 million over 1893 and even 200 million larger than the remarkable yield of 1891. Of the effects of such excellent harvests upon the future of business and the traffic and earnings of transportation lines there can be but one conclusion. The cotton crop of the United States for the year ending August 31, 1895, amounted to 9,901,251 bales, showing an increase over the crop of 1893–94 of 2,-351,434, over that of 1892–93 of 3,200,886, and over the largest previous commercial crop (that of 1891-92, when the total was 9,035,379,) of 865,872 bales.

A TEXAS subscriber writes for information regarding alleged patent selling agencies. His experience leads him to believe that the majority of them are frauds. He has bought his experience. His last experience seems to have been with the "Scientific News," Buffalo, N. Y. He thinks it a strange coincidence that his letter containing money should be taken from the postoffice and that now his letters of enquiry should be returned marked by the postmaster "refused." As the INVENTIVE AGE has repeatedly said, these patent agencies want the "advance fees" only. They do not want to be bothered with letters of enquiry. The INVENTIVE AGE circulates largely among inventors and although it has made repeated enquiries not an inventor can be found whose dealings with patent agencies have been satisfactory. In relation to the complaint in question the postmaster at Buffalo says that there is no such paper as the *Scientific News* regularly mailed at that office, from which it may be inferred that the Scientific News agency is another of those "advance fee" fakes so numerous and so liberally patronized by the confiding inventors.

THE iron trade revival is not without its indications elsewhere than in the United States, says the Age of Steel. In product, consumption and prices, the tendency is upward, with the one-time Vulcan of the globe—Great Britain—getting his veteran sinews into play again. Now while this may indicate increased competition in foreign trade, it has the broader and more vital significance, as an evidence of an increasing puchasing power elsewhere. It is this special feature that establishes a hopeful outlook for business. The trade of nations depends on the healthfulness of its several parts to round out the activity of the whole. In the trade of Great Britain we have the pulse of universal business, and the open rebuke of such economic falsities as would make us believe that the impoverishment of one country is essential to the prosperity of the rest. In a general, as in a strictly sectional sense, the iron and steel industries, as they rise and fall in the barometer of trade, show the ebb or the flow of the prosperity of nations. From this standpoint the revival of the iron and steel trade of Great Britain signifies more than the industrial activity of one country.

THE convention of the American Street Railway Association held in Montreal on the 15th of last month, was probably the most successful ever held by that body. The attendance was large and the display made by manufacturers of street railway supplies was varied and complete. The question of admitting other than bona fide street railway people as members of the association provoked a spirited contest, but it was finally overwhelmingly decided not to admit manufacturers and supply dealers to membership.

The address of President Hart dwelt upon the rapid development of the street railway industry, the some startling figures were presented. It was shown that while the street railway mileage of the country is but 7½ per cent of the steam mileage the passenger receipts of the former equal 45 per cent. of the latter. The executive committee urged upon the convention the importance of enlarging the scope of the association to include a bureau of information for the purpose of collecting and distributing statistical information and particularly to investigate patents on devices for railway equipment with a view of determining their validity and utility. H. M. Littell of Brooklyn, was chosen as president of the association for the ensuing year.

WE PRINT on another page of this paper a letter from J. M. Boyd, of Wisconsin, which contains some points of special interest to inventors. We know nothing about the particular case to which it refers, but no doubt other inventors have met similar difficulties in putting their inventions to practical use. Mr. Boyd's plan of having a protective association to determine the value of inventions, and establish the rights of inventors we do not regard as feasible. A large majority of inventors are inclined to be suspicious, secretive and exclusive, and not at all disposed to co-operation. Besides this their interests are of such diverse character that co-operation is well nigh impossible. A patent is like a deed to a piece of land, valuable or worthless for what it covers, and the great body of inventors can no more determine the value of a patent, than the land holders of the United States can determine the value of a piece of ground in New York City, or in New Mexico. The particular difficulties of which Mr. Boyd complains are, first, that the patent office does not act upon applications with satisfactory care and promptness, and second that the courts do not always deal with patent questions intelligently and equitably. These facts are to well known to need re-stating. The remedies for these difficulties are in the hands of the legislators. If Congress will provide proper facilities, the business of the Patent Office can be greatly improved, if none but capable, and honest judicial officers were appointed the second obstacle would be removed. Both of these questions can be determined by Mr. Boyd and other voting citizens of the United States. The association about which Mr. Boyd inquires is the American Association of Inventors and Manufactures, of which Dr. R. J. Gatling, the famous gun inventor is the president. Its membership includes many inventors, rich and poor, a large number of manufacturers and others directly or indirectly interested in the

subject of inventions. It takes no part in the personal intersts of its members, but is doing important and useful work, in promoting harmony and just dealing between all persons interested in inventions, and in gradually bringing about some needed modifications of the patent laws by presenting the subject intelligently and candidly to Congress.

NOTES.

Thirty Knots an Hour.—The Sokol, a new torpedo boat, just completed for the Russian government by the Yarrow Company on the Thames, has developed an average speed of 29.773 knots in six miles and in three of them an average of 30.102,—the fastest on record. The Sokol is 190 feet long, and developed about 3,700 horsepower with 160 pounds of steam and 405 revolutions. The vessel is built mainly of nickel steel.

* * *

Soldering Glass.—Soldering glass is now possible, according to "Invention" (London), which says that Charles Margot has found that the work may be admirably done with either of two alloys, one containing 95 parts of tin and 5 of zinc, and the other 90 parts of tin and 10 of aluminum. The first of these melts at 200 degrees Farenheit, and the second at 390. Either of them may be used by heating the pieces of glass separately with the solder, or with an ordinary soldering iron. The pieces of glass require to be simply pressed together and allowed to cool slowly.

* * *

Value of the Banana.—Much has been written of the food value of the banana. It is bound to take an important position in our food supply. Banana flour has been lately adopted to the manufacture of yeast. From its richness in starch and good flavour it is particularly suitable for such a purpose, the yeast being of good colour, of the requisite properties for keeping well. Alcohol obtained by banana yeast leaves nothing to be desired. In some breweries satisfactory experiments have been made, while 20 per cent. of malt has been replaced by the less expensive flakes and flour of bananas. The flavour of the beer was not altered and the liquid was increased.

* * *

Ozone.—It is a current belief that the odor arising from a flash of lightning is that of sulphur, and it is often said, in countries liable to fierce thunderstorms, that one smells brimstone after a particularly close discharge of electricity. As a matter of fact, however, it is not sulphur, or brimstone, that is smelled, but ozone, which is set free by the electric arc passing through the air. Countries having an excess of ozone are mostly very healthy and wind and thunder storms, while not at all agreeable, give to the plains of the great northwest a wonderfully pure atmosphere. The superabundance of ozone in the atmosphere is what has made the Dakotas a famous resort for comsumptives.

* * *

Cost of Great Bridges.—The latest official computation puts the total cost of the Brooklyn bridge at $17,489,855. The bridge when contracted for was to cost $10,800,000. Actually, the bridge cost $15,000,000. Subsequent expenditures, which have brought the total cost up to the present figure, are due to the acquisition of new approaches and to improvements upon the structure. The Brooklyn Bridge is the most expensive work of the kind in the world, exceeding in cost any other bridge of which authentic figures are available. The bridge over the Forth in Scotland cost $14,000,000, the Victoria Bridge in Canada cost $12,000,000, the bridge across the Volga at Saratov in Russia cost $4,000,000. The cost of London Bridge was $10,000,000, of Waterloo Bridge $5,500,000, and of the Westminster Bridge $2,500,000.

* * *

Petroleum for Fuel.—The discovery of pretroleum deposits all over the world has called the attention of inventors to its use as a fuel, and many experiments, both unsuccessful and useful, have been made to adopt it to sea-going vessels. It will undoubtedly become an important fuel for producing steam. An Italian engtneer, Cuniberti, has made a long step in advance in a practical method of utilising it for fuel on sea-going vessels. His system, which is based upon the spraying into the boiler of the oil, was first tried on torpedo boats. Italy has now adopted it on her latest battleship, the Sardegna, and will introduce it as an auxillary means on all new vessels. The large armoured man-of-war, Castelfiardo, has been exclusively fitted up for firing with petroleum, but has not yet been fully tested. The German Emperor has secured the services of Cuniberti to instruct German engineers on the subject. Russia is also following this method. Its use will, no doubt, become general so soon as practical means can be found, as it has many advantages over the use of coal.

* * *

Gilding Silk.—Gilding silk is almost as old as its manufacture. More than 50 years ago, Govin attempted to fix metallic gold on silk by means of chemical reaction. He first impregnated it with a solution of chloride of gold which is soluble in water, and then exposed it to gases which reduced it to a fine metallic powder, which was mechanically incorporated with the fibres of the silk. It was made bright by polishing. As the silk was practically saturated by the gold, the process was an expensive one. A s the polish was only on the outside, and the entire mass of silk was impregnated with the valuable metal,it never attained any commercial success. Lately, however, by electrolysis, a cheap method has been discovered. By this means silk can be covered with silver and gold. The silk is first treated in a solution of silver nitrate and the moisture wrung out. The fibre is then exposed to an atmosphere of phosphoretted hydrogen, or to the effects of a solution of phosphorous with carbon bisulphide. The presence of the metallic silver in the first case, or the silver sulphide in the second on the fibres thus make it possible to thinly coat the silk electrolytically with metallic gold in a bath containing the double cyanide of gold and potash, the metallic appearance being afterward obtained by polishing. The process is not an expensive one, relatively to the cost of the precious metals used.—*Invention.*

Dutton's Pneumatic Balance Lock.

If the scheme proposed by Chauncey N. Dutton, a Pittsburg engineer, is practical, and eminent engineers have already declared that it is, ocean vessels may, in the near future, pass into the harbors of the cities of the great lakes as easily as they now navigate the Suez and other ship canals of the world. The difficulty to be overcome is the great height of Lake Erie from Lake Ontario, something like 320 feet. It is evident that the building of ordinary locks to effect this lift would be altogether too expensive, and it is to overcome this objection that the Pittsburg engineer has applied his inventive genius. It has been estimated that in order to effect the necessary lift of 320 feet from Lake Ontario to Lake Erie, no less than twenty or twenty-five locks would be required; and if these were as capacious as the new American lock at Sault Ste. Marie they could not be built for less than $175,000,000. But an additional canal, from Oswego to the Hudson, is also in contemplation, and such locks on the route would cost nearly or quite $250,000,000. Mr. Dutton, however, proposes a new system of locks invented by himself, and very much less expensive. He estimates that two of his "pneumatic balance locks," each with a lift of 160 feet, and costing only $3,000,000 apiece, might be substituted for the whole twenty-five Welland Canal series. Presumably not more than three of these would be required on the Oswego-Hudson route.

Mr. Dutton would have an airtight and very strong caisson, closed above and open below, about 500 feet long, 65 feet wide and over 160 feet high. This would be filled with compressd air to give it buoyancy' and would be immersed in a well of slightly greater dimensions, so that it could rise and fall in the latter like a gas works reservoir. Light iron-work guides would be built on either side, but no masonry would be needed. On top of this huge tank would be a receptacle of the same length and width, but designed to hold twenty-six feet of water, or enoagh to float the largest ocean steamship. There would be suitable gates at the ends of this part of the lock, opening respectively on the upper and lower levels of the canal. In order to facilitate the raising and lowering of such a lock, Mr. Dutton would construct, either beside it or in line with it longitudinally, another of similar size, design and weight. A pipe would connect the two air chambers. Then when the brakes were released, and a little extra burden of water or other freight were added to one lock, it would gently descend and drive the other one up by the pressure of the air flowing out of the one caisson into the other. This balance principle has already been applied to other forms of locks, and is perfectly sound; and Mr. Dutton claims that the pneumatic part of his plan has been fully tested in the pneumatic drydock. A full presentation of the subject was recently made in the pages of *Harper's Weekly.*

The Canadian Ship Canal.

(*Continued from page 169.*)

insulated by 3-16ths of an inch hard rubber sockets, and washers, so as to prevent the current from passing on to the metal of the machinery. Cords run from the switch handles to pulleys on the ceilings, and by these are conducted to the controllers, and the switches are closed by the motorman pulling the cords without having to leave his position. By this arrangement the danger of damage to the machinery (from the cross head running ablock at the ends of the screws) is prevented.

The machinery which has been described is the first electric power machinery ever used for operating the gates and valves of canal locks. For both the old 1881 lock and the new 1800 feet lock on the American side of the St. Mary,s river, hydraulic machinery is used.

The reasons which led Mr. James B. Spence, chief draftsman of the Canadian Department of Railways and Canals to adopt electricity were that the difference between electric and hydraulic power would be very trifling, and here the point of economy was not taken into consideration, Besides, one of the main objects of using electricity was to overcome the great trouble caused by frost when hydraulic machinery is used. During the closing weeks of navigation the cold is so great that oil has to be used in the hydraulic engines placed on the lock walls, and even then the cold causes the oil to thicken and makes the action of the engines slow and tedious. Of course, frost would not have interfered with hydraulic valve engines placed at the bottom of the lock, but in this case engines would have been required, while only four screw power machines are needed with the machinery as designed. These considerations seemed to make it advisable to use electric power throughout.

JAMES B. SPENCE, C. E.

Two 45 in. 155 H. P. turbines, equalling a combined power of 310 H. P., supply the power for operating the generators and pumps. One turbine will be used for running the generators, the other for running the arc light dynamo and general shop work, but when it is required to pump out the lock, the two wheels can be coupled and used to operate the centrifugal pumps. There are two of these pumps, and they have a combined capacity of 32,000 gallons per minute. The two pumps will lay the lock chamber dry in between 6 and 7 hours.

It should be noted also that near the upper end of the supply pipe there is a 6′ 8″ valve operated horizontally by two Tobin bronze screws; also two 5 ft. valves are placed in the supply pipe immediately above the power house, permitting of either the whole of the pipes or of either or both turbines being laid dry when necessary. There is also an auxiliary 13 inch turbine for driving the incandescent lighting dynamos independently.

The electrical plant for operating the gates and valves and for lighting the canal and approaches, was supplied by the Canadian General Electric Co., Ltd., of Toronto and Peterboro, under detailed specifications drawn up by the government electrician, Mr. D. Bryce Scott, The current for power purposes is supplied by two 45 K. W. 500 volt Edison

standard bi-polar dynamos, either of which is of sufficient capacity for operating under normal conditions.

The lighting plant consists of a No. 7 Wood arc dynamo, having a capacity of forty 2,000 C. P. lamps, and a 3 K. W. Edison bi-polar incandescent machine for lighting the power house and repair shops.

The motors operating the gates are the Canadian General Electric Co.'s 50 H. P. railway type, and are operated in pairs by parallel controllers, the connections across the canal being made by heavily armored submarine cables. The valve motors are also connected in pairs in exactly the same manner as described above.

The lighting of the canal and approaches is accomplished by means of a row of arc lamps down each side of the canal, situated at about 300 feet apart, as shown in the plan above. These lamps are double carbon of the standard "Wood" type and are supported by means of iron poles and hoods placed on the top of 40 ft. poles.

In order to obtain perfect regulation without putting unnecessary strain upon the generators during idle periods, Mr. Spence placed a mitre wheel upon the end of the turbine shaft, arranged to drive a horizontal mitre wheel placed on an upright shaft which extends deep in the well and firmly secured in the bottom step. On this shaft are placed two propeller wheels of a size to meet the power required, one facing up and the other down, which causes no undue strain either up or downwards. When the regulator is not required, such as when running the the large centrifugal pumps the horizontal mitre wheel can be uncoupled. In this manner the object has been accomplished satisfactorily.

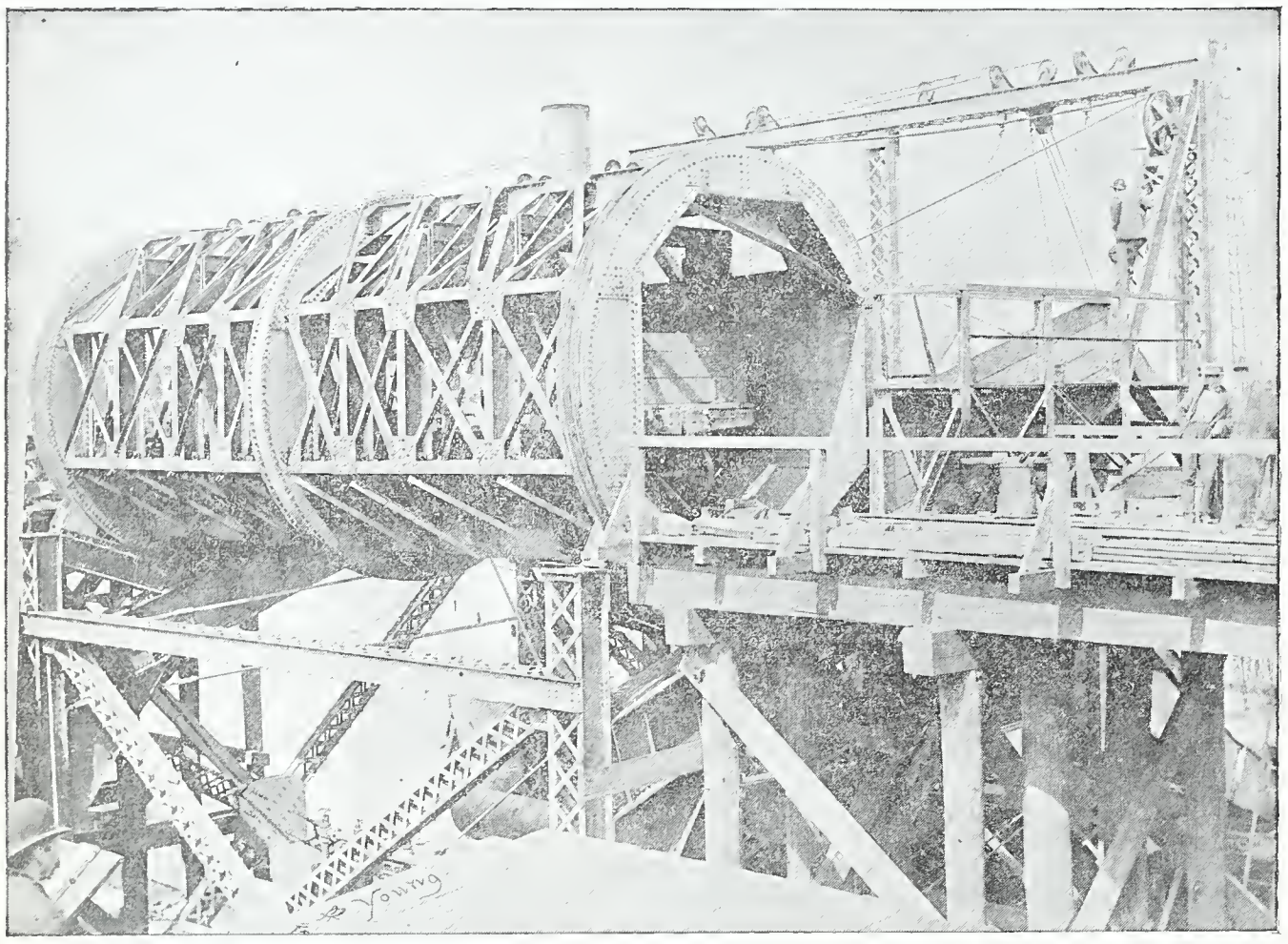
The lock, lock gates and power house and all the valve and gate machinery were designed by Mr. James B. Spence, of Ottawa, to whom we are indebted for the information contained in this description, and the uninterrupted smoothness with which the entire work has operated since the opening of the new lock, which indicates the thoroughness with which every detail has been work out.

For illustrations and data for this article we are indebted to Electrical Engineer.

Prof. Leonard, Stejeneger of the Smithsonian Institute, who is held to be authority upon the seal and seal fishing, has returned from Behring island. "I was at the island the last time 12 yearsago," he says, "and I would hardly realize that the places were the same. The war upon the seals has had a dreadful effect. The herds are notably depleted.

Long's Wonderful Coal Unloading Machine.

Apparatus for the rapid and economical handling of coal at lake docks, with a minimum of breakage has been the desideratum of the large coal shipping interests for years. In the past two seasons experiments have been carried on with two or three machines that promise to be prominent factors in the lake coal trade. One of these, for which the claim of preeminence is made, on the score of speed and convenience, is the Long car dumping machine, the invention of Timothy Long, of the Long Mfg. Co., Cleveland. His apparatus, of which views are given in the engravings, is being operated at the N. Y., P. & O. coal dock, Cleveland, by the Erie Coal Transfer Co., whose offices are connected with the well-known coal firms of Osborne, Seager & Co., Walsh, Upstill & Co., and Morgan, Moore & Baine. Mr. Long has designed a number of improvements in coal handling machinery, including a patent bottom-dump coal bucket and a steam clam-shell bucket.



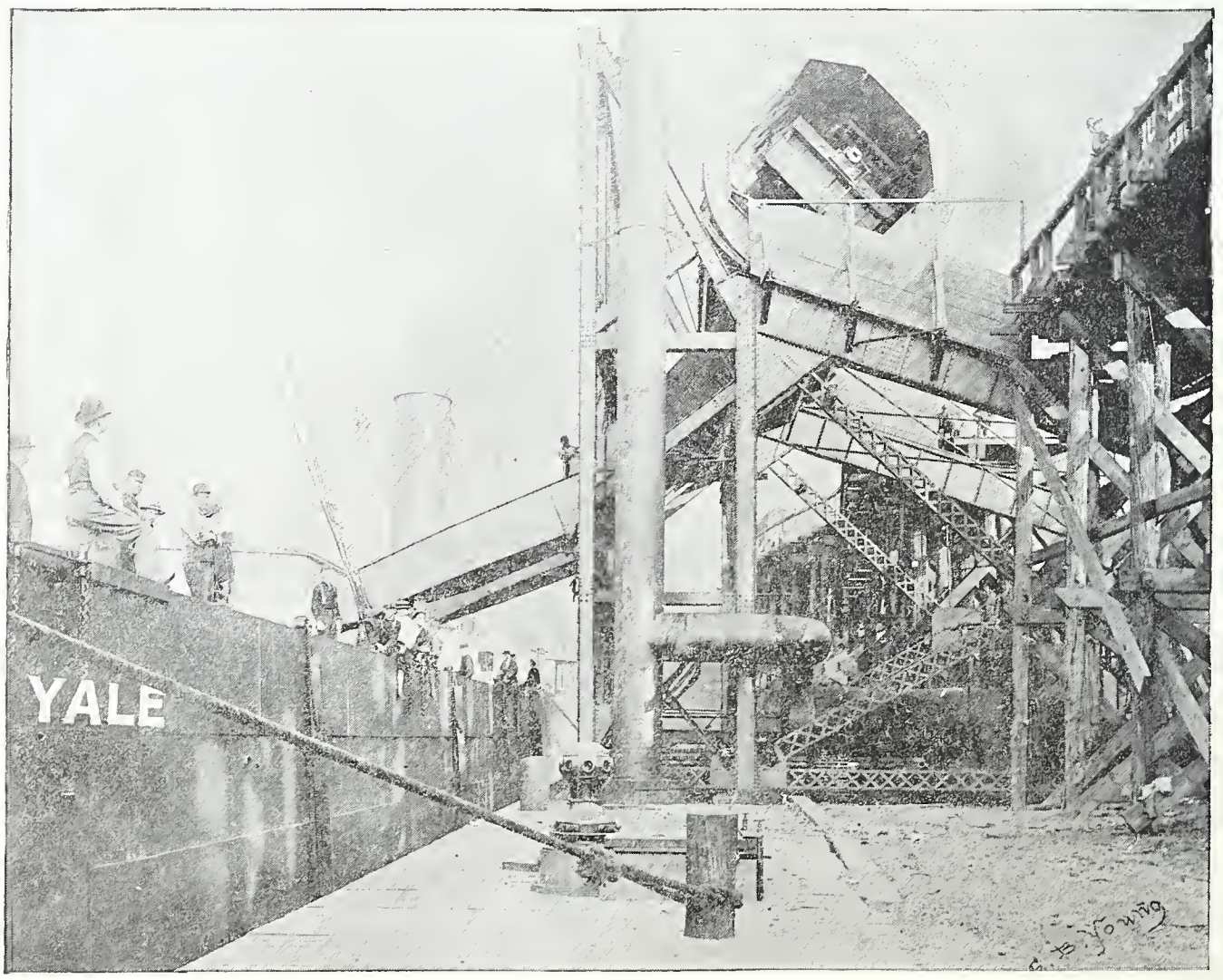
LONG CAR DUMPER AT REST.

The Long Manufacturing Co.'s Machine was built by the Excelsior Works Co., of Cleveland, O., and operated by Timothy Long, the inventor.

Geo. W. Short, President of both companies took President Samuel B. Dick and Superintendent Blair of the Pittsburgh, Shenango and Lake Erie road to the Erie dock to see this wonderful machine unload coal. They held watches on the time and were much surprised that the machine could take a car of coal from the track, dump it and place it on the track again in just twenty seconds.

The Erie Coal Transfer Co., has a trestle which will hold 55 loaded and 70 empty cars on a level with the coal dumper, and as quick as cars are emptied it can send them on direct to the ore docks to get return loads. The trestle is connected directly with the tracks of the Pittsburg and Lake Erie and the New York, Lake Erie and Western roads.

The main portion of the apparatus, shown in the illustrations, is a stiffly braced steel cylindrical skeleton, weighing 40 tons empty, or 80 tons when containing a car. The cylinder is 40 feet long, with an external diameter of 16 feet and a clear internal diameter of 11 feet. Situated on a level with the trestle already referred to, the cylinder contains a section of track on to which any car from five to eight feet high may be shifted. As soon as the loaded car is in position in the cylinder, the side toward the vessel into which its contents are to be dumped is clamped by a hydraulic buffer arrangement instantaneously worked with a lever, while the first movements of the cylinder releases four pairs of automatic clamps, each pair weighing a ton which jam down upon top of the car sides. The cylinder is shown at rest in the first cut. At the rear end of the cylinder it will be seen that there is a small platform raised four or five feet above the rail level. Standing on this platform one man regulates the movements of the dumper by the five foot lever shown just to the right of the cylinder end. By the movement of this lever, a direct pull of 40,000 pounds, enough to do the necessary work is applied to the cylinder, which thereupon rolls up tracks, at a grade of about one in six, provided at its either end. On the tracks are conical cast steel pins which engage with four inch holes in the circumference of the cylinder to serve as guides to assure the correctness of its motion. The cylinder traverses some 17 feet of track, and with that amount of movement the car side is turned over to an angle of about 45 degrees. At this point a lip of the cylinder is brought down upon the hopper which is inclined at 40 degrees.



LONG CAR DUMPER IN ACTION.

The hopper is fan-shaped, 36 feet wide at the top and 24 feet long, tapering down to the width of two chutes. It will hold the largest car load of coal, in-

dependently of the chutes which may be kept horizontal while the car is dumped, while they may be lowered later into the hold of the vessel, thus allowing the coal to be discharged gently in a body and reducing the breakage to a minimum.

Records of dumping already made are 58 cars in 4½ hours; 5 cars in 11 minutes, and 70 cars in 5 hours. The time really occupied in the process of dumping a car is only 10 seconds, so that in regular operation it is expected that an all day average of 15 to 20 cars an hour will be readily maintained.

Power is obtained from two 70 horse power boilers on the dock level, which works two capstans besides the car cylinder and the chutes. From the dock level to the car track is 26 feet, to the upper end of the 38-foot panel occupied by the inclined cylinder track is 32 feet, and the height to the top of the cross-beam supporting pulleys to hoist the chute is 48 feet, 6 inches. The beam, which forms the front portion of the whole steel frame work is supported by three columns spaced 18 feet apart, giving a total width of 36 feet. The weight of framework, cylinder, boiler and the whole outfit combined is about 170 net tons.

The steam cylinder moves the car container by wire ropes passing over each end, arranged on the power-buckle plan. The slide valves of this cylinder are operated by a system of levers from the 5-foot lever already mentioned. For the management of the entire apparatus only three men are needed.

A Protective Association for Inventors.

EDITOR INVENTIVE AGE:

GENTLEMEN:—Some time last year a copy of your paper was received by me, and I have long thought of writing to you, and have an especial reason for doing so now. I noticed in your paper something about an "Inventor's Association," and wished to get more information in regard to it, what its object was, how conducted, etc.

I have had some talk with other inventors and they seem to think that if we could have a good, strong, properly conducted society or organization, to look after our mutual interests, and help protect our rights, that it would be a good thing, and just what we need, as at present if a poor man gets a patent on a valuable invention, some unscrupulous capitalist or manufacturer will in too many cases steal the invention, perhaps making some slight alteration, and then laugh at the inventor if he makes any objection or threatens to sue, knowing that if the inventor sues him he must give bonds for costs, etc., which alone is prohibitive to many a poor man, and meantime the capitalist can hire lawyers perhaps for less than the royalty he would have to pay on the invention, pushing the sale of the invention and making money to pay lawyers, etc., out of it, and crowding the inventor out of the market on his own invention, while the lawyers get the case staved off as long as possible, or brought before some court that they know to be unfriendly to patents; getting some expert to explain the case to suit them, magnifying any slight difference in the machines to make them appear different, or claiming to find an anticipation, or getting it thrown out on some slight technicality, or stealing away some of the exhibits in the case, or otherwise defeating justice, if the inventor manages to get the case to a hearing; whereas, if the piratical capitalist or manufacturer knew that he would not only have to fight the one poor inventor, but a strong society or organization of inventors bound together for mutual protection, or if the inventor could bring the suit in the name of the State or the United States, and at its expense, as he could if the pirate had stolen a cow or horse, or even a dog or sheep as should be the case, he would be much more careful how he infringed, knowing that the law could be enforced; and it seems to me that we ought to have some such organization, and that every inventor ought to join, the fees to be nominal, the organization under proper management, all infringements reported to headquarters, and the organization to stand by and help each member in maintaining his rights, etc., which would tend to make all property in patents much more valuable than at present.

The special reason which I have for writing you now is that I have had a case in the courts, dragging along about ten years, using up almost my last dollar, and that I am now suffering from what I consider an unjust decision of the supreme court, probably inadvertantly made, not that I would put my judgment against that of the Most Honorable Supreme Court, but that this decision seems contrary to their ruling in other cases on similar points, as well as to the testimony, being based on the testimony of the defendant's expert that was contradicted in effect by himself in cross-examination, seemingly not noticed by the court.

The history of the case, in brief, is as follows: After much trouble and expense in perfecting a new hay carrier, and after several amendments and delays, including one interference case decided in my favor,I finally succeeded in obtaining a patent on my invention, (No. 300,687, June 17, 1884,) though meantime several other parties who had seen my invention had copied after it, using the main parts but making some slight alterations in the construction of other parts; accomplishing only the same results with more mechanism, and some had rushed their cases through and secured patents ahead of me, on their constructions, one party giving his attorney $100 I hear to hurry the case along, thinking to get ahead of me, although my application was filed some time prior to his, which gives me priority.

My invention went almost immediately into quite extensive public use, having great advantages over other machines for the same purpose then in use, and after the patent was issued I served notice on the manufacturers of the infringing machines, and finally brought suit against one of the companies, who changed their lawyers several times, succeeded in getting the case staved off for some time and in finally getting it before a judge known to be unfavorable to patents, who after considering it about six months threw it out as simply mechanical skill, holding that a mechanic after seeing the prior machines could have produced mine, although my machine produced or accomplished functions not accomplished by any prior machine,—the clerk of court meantime allowing the defendants to carry away some of our most important exhibits, one of which was afterward found in the warehouse of a brother of one of the defendants, and another was never found.

I had also several other cases pending in the Patent Office but allowed them to go back after this decision, as I could not afford to pay the Government for patents which its courts would not uphold. But afterward, as the supreme court seemed to be upholding patent cases on small points in many cases, I took new courage, appealed my case, and worked up several other new inventions. I had great hopes of success in view of the many supreme court and other decisions upholding our side of the case as we thought, (nearly 100 in all) and put almost my last dollar into the case, beside risking that of friends who came to my aid. The case seemingly so plain and sure, in view of recent supreme court decisions. The cost of reprinting the record was very heavy, almost prohibitive, as the defense had introduced a lot of unneccessary patents, probably for this purpose and to confuse the courts, and after getting the record printed we found that more of the exhibits had been stolen or lost and had to be replaced. When the conrt came to consider the case they based their decision on part of the defendant's expert testimony, assuming my patent to be valid, but holding that my invention was not a pioneer invention and that defendant's machine was different and did not infringe, although the defendant's expert himself in effect afterward contradicts this in his cross-examination, admitting that none of the prior machines, taken separately, will accomplish all the same functions, *as he now understands them*, and that the slight differences are *mechanical equivalents*, etc., some parts of the two machines being *actually interchangeable*, in Miller et al. v. Eagle Mfg. Co. decided Jan. 8, 1894, supreme court, is held to be an important test as to infringement, also in Union Water Heater Co. vs. Desper (Id. 335.) the supreme court says: "It is equally well known that if any of the parts are only formally omitted, and supplied by a mechanical equivalent performing the same office and producing the same result, the patent is infringed."

How much more then when this part is admitted by defendant's expert to be a mechanical equivalent, is shown or suggested in my patent, (Fig. 3, claims 3. 8. 12. etc.) and these two parts are interchangeable between the two machines.

There were also several other points on which the court seems to have gone directly contrary to a number of its former decisions as plainly as on this, probably not noticed by the court, the case being under consideration about the same time as the rehearing of the income tax case, and numerous other cases, and evidently not receiving proper consideration. And thus a great wrong has been done me, as several parties are making infringing machines, and they have been and are being sold by the thousand, while I have been robbed of my last dollar by the decision in this case, (Boyd vs. Jonesville Hay Tool Co. et al. decided May 20, 1895,) instead of the courts "encouraging the inventor," "upholding his rights" etc.; and I have also been informed that the defendants spent $7,000 on the case, and was coolly infomed by one of the court attaches at Washington that "Offield (defendants attorney) is our man," before he had inquired who my attorney was, which may account for some of the strange proceedings, losing exhibits, etc. But what can I do, as my attorney informs me that it would be almost useless to attempt to get a rehearing, and that the rules of the court require a petition for same to be presented during the same term in which the decision was made, which we had no chance to do as the case was not printed until a few days before the court adjourned, and I have not the means to make a strong fight if it could be reopened.

It seems to me, however, that if there is any proper organization of patentees, or others interested in patents, that this would be a good case for them to take hold of, if any thing can be done to prevent an unjust decision being left on the records, or if not, to see that laws are enacted which will protect inventor's in such instances. If the courts can use me in this way, defeating my rights instead of protecting them, they can also use others the same way, contrary to former decisions, and what is the use of our paying the Government for rights which its courts will not protect? Such a decision as this it seems, is a severe blow to the whole patent system, and to all parties interested in patents, as well as the public at large who get the benefit of all inventions and improvements, for if an infringer can dodge a patent by simply slightly changing a piece, or adding one or two pieces, as in this case, almost any patent can be dodged.

This letter is not written particularly for publication, but if there is any society or organization to whom you could hand it, who could help me in any way, or if you could advise me how to get such help, I would be greatly obliged, and you may use the letter as you choose. Yours respectfully,

J. M. BOYD.

Fond Du Lac, Wis.

ENEMIES OF PATENT RIGHTS.

Alleged Encouragement To Inventors Of Railway Appliances.

EDITOR INVENTIVE AGE:

The last party for such inventors to approach for encouragement is a railway association which neither makes nor sells; but its members simply buy and care not if all inventions lack patent protection. If not patented, each railway company can buy the invented device much cheaper.

Will the inventor be influenced by such an association?

A similiar association is now proposed for street railway companies. A committee reported upon the matter at the recent Montreal Convention, and the writer desires to call attention to the advantage (?) number 11, which reads as follows:—

"Advantages of employes of street railway companies in getting valuable information and assistance on their own inventions,—whether patentable or infringement of other devices, without cost to said railway or emplyee."

The committee further reports that the association would have their patent attorney for advising inventors.

Thoughtful inventors will not go to such an sssociation for an opinion as to patentability. For them to do such a thing would be like a complainant in a suit asking advice of the defendant's attorney.

All associations formed of *purchasers* are against patent rights, not that they would overthrow the patent laws, for it is the patent law which truly and rightfully encourages progress and improvement. In the report referred to and which has been widely published in engineering periodicals as well as in railway papers, all inventors should read between lines and be as wary as the fox. To talk thus in the abstract is sufficient for businesslike inventors and the "old fish," but to make the matter apparent to hundreds of inventors lacking in faculties, outside of the inventive power, let an illustration be given—not to argue against any alleged fraud on the part of the Committee but to prove the error of the policy of an inventor's applying to such an association for an opinion as to the propriety of applying for a patent.

Suppose the employe of a railway company make an improvement in railroading to overcome some difficulty.

Let it be assumed that he does not first apply to the patent bureau of the association but to some professional man adapted to render an absolutely disinterested opinion—a man having no interest in any railway company. Suppose, also, that this professional man makes an euthusiastic report in the inventor's favor. And suppose, also, he establishes the value of his invention by other sources. Now let him go to the attorney of a railway association. What difference will it make whether the attorney makes a favorable or unfavorable opinion, or whether the attorney is honest or dishonest? The trouble will always be that the inventor will have no faith in it, because he knows that the association desires to buy its devices without paying royalties to the manufacturer. Let the inventor confide in that association and he is in danger; let him confide in himself and in disinterested parties and he is safe.

In reviewing the history of inventions, it is noticeable that the successful inventors are those who have their own opinion and act upon it until they find whether they are right or wrong—this is better than confiding in an opponent to inventors.

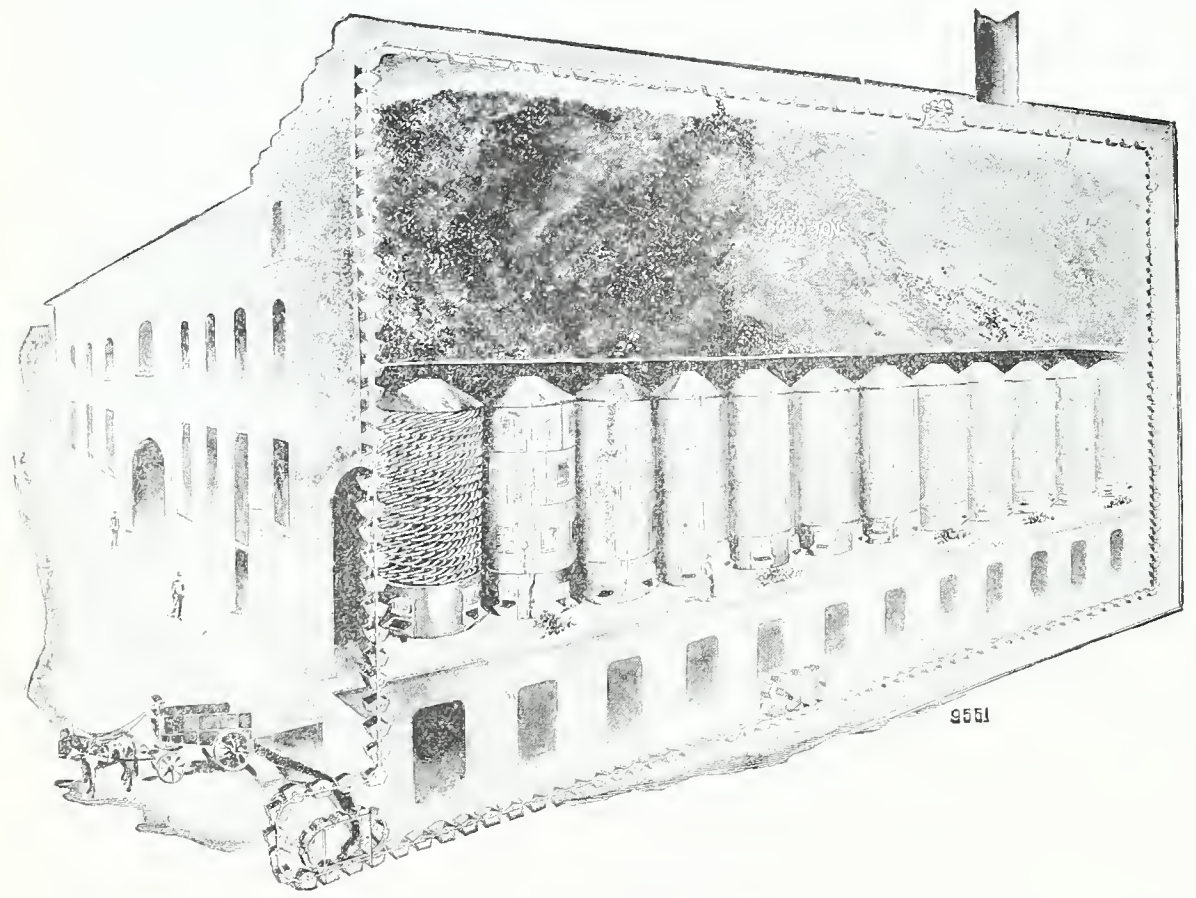
EDWARD P. THOMPSON, M. E.

Hunt Coal and Ash Handling Machinery.

The United Electric Light and Power Company of New York, has recently erected an electric light and power station on 28th street, near the East River, that city, which, when completed will have a capacity of 19,000 horse power. One-half of the station is built on a lot 98½ feet wide by 161 feet long, and combines with the great horse power the large coal storage capacity of 3,000 tons. In this part of the station there will be eight engines of one thousand two hundred horse power each and each supplying ten thousand sixteen-candle power lights.

The current used is the two phase, and the generators will be run in parallel. The brick foundations for the engines and generators alone contain 1,200,000 bricks, each foundation being separated from the other. An electric crane, capable of handling twenty-five tons is carried over the engine room.

The coal and ash handling machinery is installed by the C. W. Hunt Company of 45 Broadway, New York City. As the station is not situated on the water front, the coal is received in wagons, as shown in the engraving, is dumped into the hopper under the sidewalk and carried by the Hunt "Noiseless" Conveyor to the top of the coal storage building over the boilers.



HUNT COAL AND ASH HANDLING MACHINERY.

This storage bin is so constructed that all the coal will run to the boilers, and the plant is equipped so that at any time an improved design of stokers may be used. On its return, the conveyor runs under the boilers and the ashes are drawn into the same conveyor that handles the coal, and carried to an ash tank (not shown in the engraving) from which they are removed at will.

At the Watervliet Arsenal gun manufactory, in West Troy, N. Y., preparations are being made for the manufacture of the largest guns ever made in this country. They are to be 16-inch coast guns, measuring 49 feet in length and weighing 120 tons.

Pictet, the French chemist, finds that by subjecting animals and insects to the intense cold obtainable from liquified atmospheric air that animals show a wonderful power of resistance to its effects. A dog placed in a copper receiver at a temperature of —60° to —90° C. showed a rise of bodily temperature of 0.5° in ten minutes, and after an hour and a half had only lost 1°. A little later, however, nature gave up the struggle, the temperature fell rapidly and the animal died suddenly. Insects resist a temperature of -28° but not 35°, while myrapods live down to -50° and snails to -130°. Birds' eggs lose their vitality at -2° to -3°; ants' eggs at 0°. Infusoria die at -90°, while bacteria are still virulent at -213°. This last fact is, perhaps, the most significant of all.

HOW THE TELEPHONE WAS INVENTED.

A Chat With Inventor Bell.

About twenty years ago a young, olive-hued, black-haired Scotchman was experimenting in Boston upon a machine by which the deaf might be made to hear and the dumb taught to speak. In doing so he made a discovery which practically annihilated distance as far as sound is concerned. He discovered the principle of the telephone, and thereby created one of the greatest industries of the world. The capital based upon his invention now amounts to hundreds of millions of dollars. The creator of this wonderful industry has been here during the past week. I visited him by appointment at his laboratory yesterday, and for three hours chatted with him about his work and the things concerning which he knows more, perhaps, than any other man in the world. I refer to Alexander Graham Bell, one of the best-known and least known men of the United States. He is best known because every one has heard of him as the inventor of the telephone. He is least known because he seldom talks for the newspapers, because it is impossible to get him to write an article for the magazines and because his modesty and retiring disposition are such that he does not let the world know of the great work in invention and science that he is constantly carrying on, only a little of which now and then filters out through the patent office, or in his letters to the great scientific societies of the world.

My appointment was to meet him at the Volta Bureau. How many of you have ever heard of it? It is the greatest institution in the world as regards the scientific study of the deaf. What the Smithsonian Institution is to general science the Volta Bureau is to the science of the deaf. It contains the most complete library upon such subjects in the world, and its collection of statistics regarding the deaf of the United States is more complete and more valuable than any other such collection in the world. Here are to be found the deductions and the experiments made by Mr. Bell, which have so benefitted these unfortunate people. He has shown how to make the dumb speak and the deaf hear, and this bureau was founded by him for the furtherance of this science. It is located in Georgetown, about a mile and a half from the White House. It is a two-story building of Milwaukee brick and stone, about 50 feet wide by 100 feet long. It has a flat roof and its architecture makes you think of the houses of Pompeii. It is fireproof, and in its basement for the time is stored Mr. Bell's scientific library, which came so near being burned when the fire broke out in what is now ex-Vice President Morton's house on Scott Circle, but which at that time belonged to Mr. Bell.

The story of how Mr. Bell founded this bureau is an interesting one. Connected with it came the invention of the graphophone, which the courts have lately decided has priority rights over the inventions which make Edison's phonograph now practical. It illustrates one side of Mr. Bell's character; that of his love for science, and also his desire not to take anything unless he can give something in return. He told me the story.

"The Volta Bureau," said he, is the outcome of the Volta prize. Napoleon Bonaparte founded this prize when he was Emperor of France in the honor of Volta, the Italian, who invented the voltaic battery and other things in electricity. It consisted of about 50,000 francs, or about $10,000, and was to be voted by the French goverment on occasion to any one deemed worthy of it as having invented something for the benefit of humanity. It has been awarded only three or four times since Napoleon founded it, and it was voted to me on account of the telephone. It came when the telephone was already a success, and had made me financially independent. Upon receiving the money I decided to donate it to the improvement of the deaf and I did it in this way. I had associated with me Mr. Chas. Sumner Tainter, and my cousin Mr. Chichester Bell, who is also an inventor. I proposed to them that we take the money and establish a laboratory, each of us putting in our labor as a part of capital stock, and the Volta prize to be a fourth part of the company, and to be used as a working fund.

With this we were to establish a laboratory with the understanding that in it each of us should devote a part of our time to our special hobby in the way of invention, and at the same time we would work together on some one invention, which would be commercially profitable. This was agreed to and we went to work.

My hobby was the study of the deaf, Mr. Tainter had an invention in optics which he was trying to perfect, the exact nature of which I do not feel at liberty to give, and Mr. Chichester Bell was working on his wonderful experiments in regard to recording speech by means of photographing the vibrations of a jet of water. We looked about for some time for the subject of the invention that was to pay the bills, and concluded to take up and develop the phonograph. The idea had been originated by Mr. Edison, and he had produced a little tinfoil phonograph, which was a screaching, squeaking toy, but of no practical value. The needle made the indentations on the tinfoil, and these were liable to be bulged upon or erased. The result of our work was the invention of the graphophone, by which the record of the sound was cut into a cylinder of wax and a permanent impression made. After we had made the discovery we attempted to form a combination with the company owning the Edison patents, but Mr. Edison, to a certain extent repudiated their claims, and we organized a company independent of them. There is no doubt in my mind of the value of our patents, and I expect to see the graphophone go into general use. Well, we organized a company, and I sold the stock represented by the Volta prize for $100,000; $25,000 of this I gave to the American Society for Teaching Speech to the Deaf, and with the remainder I established the Volta Bureau."

This conversation took place while Mr. Bell and myself were walking together through the libraries of the Volta Bureau. After the above remarks he went on:

"But perhaps you would like to see the place where the Volta Bureau originated. I will take you where no newspaper man has ever been before. We will make a visit to my laboratory."

He then led the way out of the bureau. We crossed the street and stopped at the back of the lot on the opposite corner before a little red brick building of two stories not more than forty feet square, and looking for all the world like a stable. "This," said Mr. Bell, "is my laboratory. It was my father's stable, and we have turned it into a workshop. Here I have made a great many experiments of late years and in it I have all of my models." We entered and passing through a workshop containing benches and machinery, came into a large room walled with shelves filled with models and instruments of all kinds, and reminding me much of one of the model rooms of the patent office. In the center, filling up nearly the whole floor, was what at first sight seemed to be a model of a new threshing machine. It was at least 100 feet long and had a wide inclined plane running up into the air at an angle of forty-five degrees. I asked what it was, and was told that it was a type-setting machine for the instruction of the deaf—a sort of a lineotype, as it were, to be used in deaf schools, by which words could be put upon a blackboard and the letters distributed again. On the shelves in the walls at the left were perhaps fifty models of telephones, and among them the first one that Mr. Bell ever made.

It consisted of two telephones, as it were, and was exceedingly clumsy in appearance. Beyond this were scores of cylinders used in the experiments upon the graphophone, little bottles of silenium, containing, Mr. Bell told me, the largest quantity of this almost invaluable material in existence in the world to-day and which he used in his experiments of telephoning without wires along the beams of a

ray of light. There were many scientific instruments, inventions illustrating new and yet unexplained theories as to the property of matter originated by Mr. Bell, and, in short, so many different things that the mere mention of them would fill a page of this newspaper.

As we looked at the original telephone I asked Mr. Bell if he could remember the time when he first realized that he had inventive power, and if he had a model of the very first invention that he had ever made.

"As to the first question I can't answer, but here is a part of what I suppose to be my first invention," replied Mr. Bell, as he took down from a hook a kind of a cross between a rat trap and a human jaw made in the shape of a mouth of what appeared to be shoemaker's wax and rubber or soft leather. It had rubber lips which opened and shut, and the jaws were hinged like those of a man. "This," continued Mr. Bell, "is my first attempt at a speaking machine. When I was a little boy my father took myself and brothers to see an automaton which uttered some words, and when we came back he offered a prize to the one of us who could invent a machine that could speak. I made the instrument of which this is a part, and I succeeded in making it say some words. We were living in Edinburg at the time, in one of those Scotch flats in which each family has a floor, with a common hall. When I had completed the machine we took it out into the hall one day and made it cry "Mamma." It made a noise much like that of a baby, and the other families in the flat ran out and asked where the baby was that was crying. I remember this delighted us very much."

"Your attention was turned very early to matters connected with speech and speech transmission, was it not?"

"Yes, my father was noted as having considerable knowledge of matters connected with elocution. He knew all about the physiological production of sound and I was brought up, as it were, in an atmosphere of sound investigation. I was educated at the High School in Edenburg, and spent a year at the university there, but my attention was early attracted to elocutionary studies, and I earned my first money as a teacher. I went out to teach when I was in my teens, and I received at first £10 or $50 a year and my board. Later on I got £70 or $350 a year as teacher of elocution and music. This was before I was twenty and at that time I devoted a great deal of attention to music. I used to compose and one of my early dreams was that I might become one of the great composers of the world."

"How about your musical compositions, Mr. Bell, were they of real value?"

"I don't know about that," was the reply, with a laugh. "I suppose not, but they seemed of great value to me at that time."

"I suppose your work in music helped you toward the invention of the telephone?"

"It may have done so," was the reply, "as I worked for a long time attempting to transmit musical sounds. When I was about sixteen I discovered what was to me a wonderful physiological fact, and that was that each of the vowel sounds has a different pitch which is formed by the change in the size in the cavity in the mouth in making them, and not by what are popularly known as the vocal organs. I found that I could produce a similar pitch in the taps upon a pencil laid against my lips, and tapped while changing the cavity of my mouth, as you do when making the vowels. You can, in fact, play a tune in this way. You can do the same with a pencil laid upon your throat, but here the sounds are reversed. I was much excited by this discovery, and I wrote the facts regarding it to Sir Alexander Ellis, a celebrated English authority on phonetics and mathematics, and received a request to call upon him when I came to London. I did so, and when I met him he told me that my discovery had been made only a short time before by Helmholz, the famous German scientist, who died last year, and that he had written a book on the subject. This was in German, which I could not well read. Sir Alexander Ellis told me about it, however, and gave me to understand that by means of vibrating metal a tuning fork perhaps, and electricity, Helmholz had reproduced sounds I understood from him that he had been able to transmit these sounds by electricity. In this I was mistaken, and it may have been from my misconception that I was thus early made ready for the idea of the telephone. I had accustomed my mind to the fact that vowel sounds had been transmitted, and if vowel sounds, why not the consonants? It was while endeavoring to transmit musical sounds by electricity many years afterwards, you know, that I arrived at the discovery."

"Had you devoted much time to electricity before this?"

"No," replied Mr. Bell. I know absolutely nothing about electricity, and it was to carry out my investigations of this question that I began to study it. I commenced with telegraphy, and learned to telegraph. I had a friend at school who was interested in electricity, and we worked together. Later on while teaching school near London, I had among my pupils one young man whom I was trying to cure of stammering. I gave him one of the instruments and practiced my telegraphy on him. All this time I was studying and teaching the physiology of the voice. I had this knowledge of the different pitch of the vowels, and as I carried on my experiments with the telegraph the idea came to me of multiplex telephony. I thought that signals of different pitch might be used in telegraphing, and in these the sounds in one pitch could be arranged so that they would not conflict with those on another pitch, and thus a number of messages could be sent over the same wire at the same time. I worked upon this for years, and the telephone was the outgrowth of this idea, and of my studies in connection with the deaf and the effort to produce some kind of an instrument by which speech could be made intelligible to them. It was while I was teaching in Boston that I succeeded. I had discovered that I could transmit musical sounds by wire, and from that it was only a step to the conception of the telephone or the transmission of speech. The discovery came slowly, and I had all sorts of difficulties, both imaginary and real to contend with. I had first a number of reeds as sounding instruments at each end of a wire, with permanent magnets attached to them, these reeds being of different pitches. I then found I could produce the same result with a battery and one steel rod. I worked for months after I had the idea that speech could be transmitted under the impression that the power of the voice would be so lost in its transmission that though I knew all the sounds could be transmitted, I did not believe they would be loud enough to be audible to the human ear.

"I made all sorts of experiments at this time in testing such matters, and in my investigations I wanted a diaphram as near like the human ear as possible. One day, in talking about this to Dr. Terrence Blake of Boston, he remarked, 'Why not use the ear itself?" I said that that would suit me exactly, but asked him where I could get a man who would give me his ear and how I could possibly keep it in good condition after I had gotten it. He replied that he would get me one, and shortly after that I received from him a human ear cut from a dead subject, and so treated that I was able to study it and use it in my experiments. This was of great value to me."

"Have there been many improvements in the telephone since your original invention?"

"No," replied Mr. Bell. "There have not. The principle of the telephone is unchanged. There have been many improvements, but they have been in the line of transmitters and receivers, and things connected with the telephone. As to the machine itself, and its fundamental principles, it is about the same as when it was first made."

"Will we ever be able to telephone without wires?"

"Yes," replied Mr. Bell: "I think so, though the distance may be limited. I remember some experiments that I made one day in a field near New Haven, Conn. We had about fifty feet of wire stretched between two pokers which we had driven into the ground and had attached a battery to them. I put the receiver to my ear, when I heard the sound of a clock ticking. There was neither clock nor watch at the other end of the wire, and by listening to the ticking I recognized that it was the ticking of the University electric clock at least a half a mile off. By this clock a number of the clocks of the city were regulated, and the sound had evidently traveled from these wires to the batteries connected with our pokers, and that for a long distance without actual wire connection. I think that our great steamers, by means of the heavy dynamos, which they carry, could telephone each other on the sea when miles apart, and I have no doubt that we will in the future be able to telephone for limited distances without wires."

"How about telephonic cables? Will we ever be able to talk across the ocean?"

"It may be, but there are difficulties there which have yet to be overcome. These will have to be mastered by some one who has the cables at hand to experiment with. I have never made much investigation along these lines."

While in the laboratory I picked up from one of the shelves a piece of pine board about half an inch thick and eight inches square out of the center of which extended a speaking tube, which apparently rested against a thin disk of bright metal sunket into the opposite side. This metal was like a silver mirror, and was about as large around as the bottom of a tumbler. I asked Mr. Bell what it was, and he told me that it was the instrument with which he discovered that he could talk from one point to another through the medium of a sunbeam, or in other words, could send sound along a ray of light without the aid of the electric wire. He took the instrument and put the tube to his mouth, holding the mirror so that it caught the sun, and cast a little shadow disk of light on the opposite wall. Then by breathing slightly he made this shadow increase and diminish and go into all forms of shape by the action of his breath against the mirror diaphragm. "That shows you," said he, "how the action of the diaphram is carried along that ray. Now if you will put a little bottle with some soot in it where that shadow is on the wall, and speak into the tube, you will find that the sound will travel along that ray of light, and by having a receiver connected with the bottle, one would be able to hear what you were saying. We have spoken by this means to and from points 200 yards apart, and there seems to be no reason to doubt that speech may be sent along a beam of light for great distances. In our experiment in this we first used selenium, a very rare substance and very sensitive to light. We have found, however, that we can produce very good results with common soot, and discoveries may yet be made which will make such an invention commercially practicable."

Upon the back of this board I read the record of the invention, stating the time when it was discovered and signed by Alexander Graham Bell and Sumner Tainter. As I looked at it I asked Mr. Bell as to whether he always recorded a discovery as soon as it was made, and told him of a recent interview which I had with Mr. Charles Brush, the inventor of the electric light, in which he told me that such records had proved to be of enormous value to him.

Mr. Bell replied that he tried to do so, but the excitement at the moment of discovery was so great that he often forgot it.

He carries on all his investigations at night, beginning in the evening, and seldom going to bed before 4 o'clock in the morning. He leads, in fact, two lives—one by day, that of the ordinary man, and another by night, that of the inventor. He finds the quiet of the night conducive to study, and that his sleep from 4 a. m. to 11, is amply sufficient to keep him in good health, and as restful as that which other mentake in the dark.—Frank G. Carpenter, in Washington Star.

A Telephone Newspaper.

The telephone newspaper organized at Pesth, Hungary, has now been working successfully for two years. It is the only newspaper of the kind in the world. It is called the Telephone Hirnondo, or Herald, costs two cents, like a printed paper, and is valuable to persons who are unable or too lazy to use their eyes or who cannot read. It has 6,000 subscribers who receive the news as they would ordinary telephone messages. A special wire 168 miles long runs along the windows of the houses of subscribers, which are connected with the main line by separate wires and special apparatus which prevents the blocking of the system by an accident at any one of the stations. Within the houses long, flexible wires make it possible to carry the receiver to the bed or any other part of the room.

The news is not delivered as it happens to come in, but is carefully edited and arranged according to a printed schedule, so that a subscriber at any time knows what part of the paper he is going to hear. It begins with the night telegrams from all parts of Europe. Then comes the calendar of events for the day, with the city news and the lists of strangers at the hotels. After that follow articles on music, art and literature. The staff is organized like that of any other newspaper, and is on duty from 7:30 in the morning till 9:30 at night. After the copy has passed through the editor's hands, for the paper is subject to the same restrictions as ordinary newspapers and is liable for its communications, it is given to the "Speakers." These are ten men with strong voices and clear enunciation, who work in shifts of two at a time and talk the news through the telephone. There are twenty-eight editions uttered a day. Additions to the first edition are announced as news items.

To fill up the time when no news is coming in, the subscribers are entertained with vocal and instrumental concerts. These were at first given for them especially in the office of the Hirnondo, but now the wire is in communication with the opera house and the music halls, and on Sundays and saints' days with the churches. The music is transmitted at times to other places in Austro-Hungary, and recently the Hirnondo microphone was connected with the circuit going from Trieste, through Vienna, Bremen and Pesth to Berlin, the music being heard in all these places with equal clearness and force. The happy Hungarian can lie abed all day and hear everything that is going on in his town.

Magazine Enterprise.

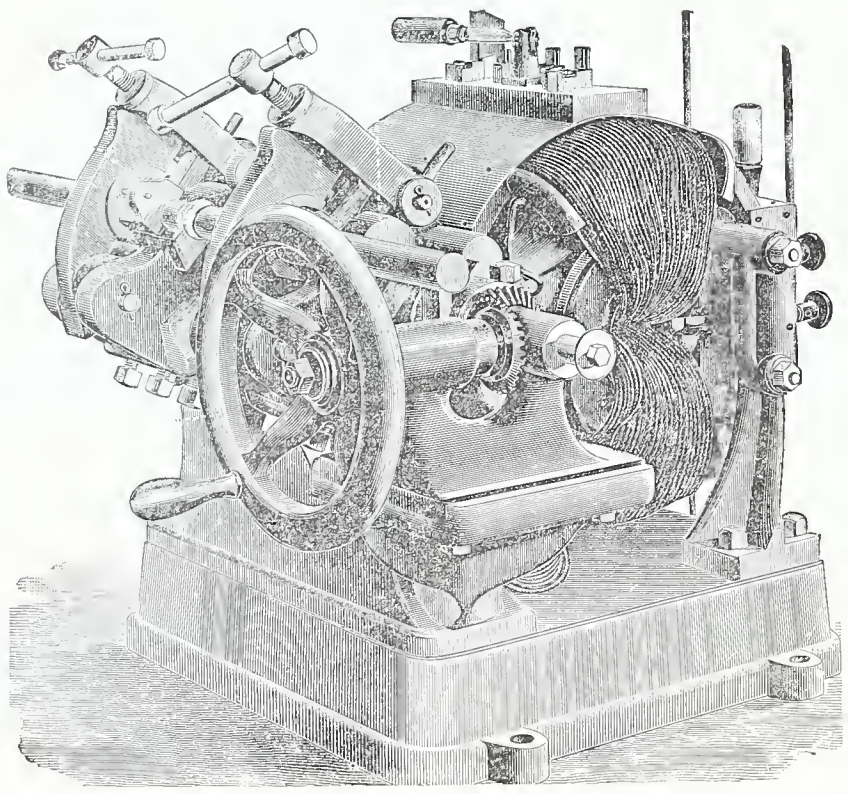
The publishers of McClure's Magazine have undertaken a very important art enterprise, which is now possible with the introduction of enameled paper in the magazine. They sent the famous artist, Mr. Will H. Low, to Europe to collect photographs of the 200 most important paintings made in this country. The results of Mr. Low's travels in Europe will be supplemented with the most important work of American artists, and the pictures will appear in the magazine with text by Mr. Low.

Electric Welding.

The process of electric welding was invented by Prof. Elihu Thomson, of Lynn, Mass. The welding machine is an ingenious and valuable application of the transformer. It is so constructed as to create an enormous volume of current in the secondary coil with a very low potential. Usually in large machines the secondary coil consists of but one turn of very heavy copper wire or casting. One end of this is movable, generally being made in the form of a sliding carriage, moving upon the solid portion of one end of the secondary.

To each end of the secondary is attached a clamp. These clamps are directly opposite one another, one fixed, the other moving with the sliding carriage. When two pieces of metal are to be welded together they are placed in the clamps, opposite and parallel; now the movable clam is drawn forward toward the other which brings the objects to be welded together into contact, which closes the circuit of the secondary coil through them. The electricity passing through the abutting ends generates heat at the point of contact which also becomes the point of greatest resistance, while at the same time mechanical pressure is applied to force the parts together.

As the current heats the metal at the junction to the welding temperature, the pressure follows up the softening surface until a complete union or weld is effected, and as the heat is first developed in the interior of the parts to be welded, the interior of the joint is as efficiently united as the visible exterior. With such a method and apparatus, it is found possible to accomplish not only the common kinds of welding of iron and steel, but also of metals which have heretofore resisted attempts at welding, but have had to be brazed or soldered.



ELECTRIC WELDING MACHINE.

The welding machine is made in various styles. The one shown in the illustration is for welding one inch rods.

The machinery which is used for producing currents for welding, is also used with suitable electric devices for electric soldering, brazing, shaping, forging, riveting and bending of metals.

Altogether the welding machine is a great invention and will no doubt prove to be of great usefulness for many years to come.

Luxuries of the Ancients.

Cleopatra drank pearls dissolved in vinegar; Madame de Maintenon bathed in the juice of strawberries the year round, having great vats of it in her cellars for the purpose; a mistress of Charles II. had ten wagon loads of violets crushed to produce the odors she required to scent her palace when giving a banquet to seven foreign princes. At one of the banquets in the time of Seneca, three thousand peacock tongues were baked in one pie.

A curious fact has been noted by Arctic travelers —snow, when at a very low temperature, absords moisture and dries garments.

Important Patent Infringement Decision.

The case of Hall, receiver, vs Traders' National Bank, recently decided by Judge Colt, of the United States Circuit Court at Boston, was a suit for the infringement of a patent which came up on a motion to dismiss the suit on the ground that by reason of the death of the defendant the suit had abated and cannot be revived. The judge said: "When a person wrongfully appropriates a patented invention, it is an invasion of the patentee's right of property, and the gains or profits derived from such piracy belong to the patentee. Because the machine in which the wrong doer may have embodied his piracy may not belong to the patentee does not affect the real character of the act.

I can see no difference in principle between a suit by the owner of a patent against an infringer to recover the profits he has made and a suit by the owner of land or of a mine against a wrong doer to recover the value of timber or ore taken. I cannot assent to the proposition that the profits actually made by an infringer, for which recovery is sought by a bill in equity, are the same as damages in an action of libel, slander, diversion of a watercourse, trespass in breaking up meadow or pasture land, and similar actions of tort. The former are the actual direct pecuniary benefits, capable of definite measurement, acquired by the wrongdoer; the latter are primarily the loss suffered by the injured party, where the wrongdoer realizes no pecuniary benefits, or only such as are indirect, indefinite or rest in speculation, compromise or arbitrary adjustment. I am of opinion that the cause of action survives and the motion must be dismissed."

Spontaneous Combustion.

Many substances take fire very easily. Greasy rags, cotton waste, etc., are readily self-ignitable. Some foreign manufacturer has instituted experiments on the self-ignition of cotton waste, and the results were very interesting. A handful of cotton waste was dipped into linseed oil, squeezed out, placed in a wooden box and the temperature observed by means of a thermometer introduced into the box. The temperature surrounding the box was kept at 70 degrees C. Soon after the temperature in the box rose to 173 degrees C., and smoke issued therefrom. When opened so as to admit air a flame burst out at once. A box from which the air was perfectly excluded, consumed after five or six hours. In another experiment in which the cotton waste was saturated with rapeseed oil, the box burned after ten hours. With an outer air temperature of 56 degrees C., gallipoli oil caused the spontaneous combustion of cotton wrapped in paper; castor oil required twenty-four hours; sperm oil, four hours; train oil, two hours, for a lively combustion.

In view of these conclusive practical results, it will readily become apparent to the thoughtful person that it is extremely dangerous to allow greasy or oily rags or waste to lie around the paint shop. Indeed it is wrong to throw such matter upon the floor at all, because it is apt to be forgotten and left lying there for some time. The safer and much better plan is to provide a galvanized iron receptacle, having a cover in which to throw all discarded waste at once, so that even should ignition ensue the contents would simply burn without damage to surroundings. If it be urged that one cannot take the time and trouble to throw such waste matter at once into the can, let us remember that the very habit of being careful in this matter will tend to making us careful in other and perhaps all things. Time spent in doing such little things is not thrown away; nothing can be gained by first littering the floor and then sweeping the litter up.

There are dry substances that sometimes self-ignite. There is the well-known example of lampblack, though it is said that the presence of small quantities of oil, which is found in the black coming from the first condensers at the factory, is the cause of the spontaneous combustion to which it is liable. Still, even the dryest black may self-ignite. Instances have been recorded where casks of lampblack have been found almost red hot after standing some time. Prussian blue is another pigment very liable to self-combustion in the dry state, but more particularly in the preparation at the factory. Then it is extremely dangerous and the utmost caution must be exercised not only to prevent its bursting into flame, but to arrange matters so that in case a fire does break out it shall be confined to small limits. Outside of the factory we have heard of no difficulty attending prussian blue in this way; of course, it is usually ground in a medium that prevents this, the dry blue being more rarely employed.

The liability of certain dry matters to explode under certain conditions is well known.

Prussian blue will burst into flame because of its chemical nature; lampblack, because usually, of the oil present: while such dry matters as flour, coal dust and other fine organic dust, explode when certain outside causes are present. Professor Tobin demonstrated before the Kentucky Miller's Association this fact and further showed that dampness destroyed the explosive tendency. Live steam was recommended as a preventive by damping the air of the mill. The same would apply to the air in a woodworking factory where it is full of dry dust. Herr Baehr of Dresden, found that leather belts, used in mills are rapid generators of electricity, and that this would fire dry dust and cause explosions. Professor Pepper put some fine flour in a small box, fitting the top with fine wire netting, shook the box and caused the finer dust to come in contact with a flame like that made with a lighted stick. Under the right conditions, the experiment will result in a large flame, resembling that made by burning of loose gunpowder.

To make combustion possible oxygen must always be present. There must be air present. The greasy rags would not take fire of themselves if kept from the air; hence, in keeping them in a tightly covered iron can the probability of combustion is reduced, and possible combustion made of no account. It is well to remember this fact. Liquid kerosene oil never explodes. Plunge a candle flame into a gasometer of pure coal gas and it will go out as it would if plunged into water; but mix air with the gas and the result will be much different. Lamps only explode from mixed air and oil vapor. Flour dust or fine wood dust, when mixed with air, will ignite like gunpowder. In a heap no trouble ensues.—The Hub.

France imposes a tax on bicycles and receives nearly $400,000 annually from this source.

A petrified skeleton of a paleozoic saurian, thirty-three feet long, has just been discovered in a stalactite cave at the Caumont quarries, between Rouen and Havre.

The first railway engine driver in England has just died from an accident at the age of 84. Joseph Bell had charge of Stevenson's historic "Rocket" —now in the South Kensington Museum.

Maj. Quinn, United States engineer, in charge of the lighthouses in the New Orleans district, says that the lower delta and the sea marshes along the Gulf of Mexico are slowly sinking. He concluded that the level of the gulf has risen one foot since 1877.

A coast gun built by Krupp, being tested at the Meppen proving grounds recently, threw the projectile 65,615 feet, or nearly thirteen miles, the gun having an elevation of forty-four degrees. The projectile weighed 474 pounds, the charge of powder 253 pounds, giving an initial velocity of 2099 feet. It is estimated that the projectile reached and altitude of 21,456 feet and its flight occupied 70.2 seconds.

A scheme to construct a canal from a point on the Platte River to the outskirts of Omaha, 49 miles distant, is assuming definite shape. The people of Douglas county will be given an opportunity to vote on the proposition to give a subsidy of $1,000,000 for the enterprise. It is estimated that a fall of 135 feet will be procured and 24,000 horse power developed. The entire cost of the enterprise is estimated at $4,000,000.

Greatest Engineering Feat of the Age.

The Secretary of War recently appointed a board of officers of the corps of engineers to "investigate and report their conclusions as to the maximum length of span practicable for suspension bridges, and consistent with an amount of trafic probably sufficient to warrant the expense of construction."

The leading features of the design upon which the estimates were made were as follows: A steel suspension bridge having a clear span of 3,200 feet between the towers, and carrying six railroad tracks placed side by side. The floor of the bridge to be provided with a stiffening truss, which shall be hinged at the center and be 120 feet in depth. The bridge to be carried on 16 cables, arranged 8 on each side; each cable to consist of 6,000 parallel steel wires wrapped together and having a breaking strength of 28,440 tons; the diameter, inclusive of wrappings, being 21½ inches.

The strength of the bridge to be calculated for a rolling load of 13 77-100 tons per linear foot, and a wind pressure per linear foot of 1 12-100 tons.

With a factor of safety of three, the cables to be strained to 30 tons per square inch. For the stiffening truss a working stress of 7 5-10 tons to the inch to be allowed.

Working upon this data, the board deduced the following table of weights and cost for a 3,200 foot suspension bridge:

STRUCTURAL STEEL.	
Suspended weights, in pounds	90,870,000
Towers	52,313,000
Chains and anchor plates	18,324,000
Total	161,507,000
At 4 cents per pound (1)	$6,460,280
WIRE WORK.	
Main cables and wrapping, in pounds	30,358,000
Backstays and wrapping	22,738,000
Suspenders	3,222,000
Total	56,348,000
At 7 cents per pound (2)	$3,942,260
Cost of superstructure (1 and 2)	$10,402,540
Cost of superstructure (foundations, etc.)	11,784,000
Total cost of bridge	$22,186,540

From an engineering standpoint it is not the total length of a bridge that determines its magnitude, but the length of the individual spans. The cost and constructive difficulties of bridge building increase at a rapidly increasing ratio as the span is lengthened. The Tay bridge in Scotland is twice the length of the Forth bridge to the south of it: but the design and erection of its two miles of short girders did not call for the exercise of one-fifth part of the skill and courage required in throwing the huge spans of the Forth bridge across the mile of deep water at the Firth of Forth. In a like increasing ratio will the difficulties multiply in stretching this mammoth structure across the Hudson River.

The seven wonders of the world, that appealed so strongly to the ancients, will be completely overshadowed on every point of comparison by this crowning feat of the nineteenth century.

If mere bulk or mass be taken as the standard of comparison, it will be bigger and heavier than the greatest of the works of the ancients; and in the scientific knowledge involved in its construction, it will embody the truths in chemistry, mathematics, and mechanics that would bewilder the Egyptian builders of the Pyramids even more than its vast stretch of steel cable and interlacing girders.

The two masses of masonry that will have to be built on shore to resist the enormous pull of the 16 cables will in their united weight and bulk, rival the great Pyramid of Gizeh.

The four steel towers that carry the cables will each, in all probability, overtop the lofty Washington Monument; and will be exceeded in height only by one structure, the Eiffel Tower in Paris. Ethically, if we may so speak, they will stand loftier than the last named; inasmuch as the Eiffel Tower is merely a spectacular "freak," whereas the four great towers of this bridge will reach their full stature as part of a great mechanical structure erected for a useful mechanical purpose.

When loaded to its full working capacity, the bridge can carry in midair, and at a height of 150 feet above the river, 17 heavily loaded freight trains, which, if strung out in line, would be two miles in length. This would represent a total load of 26,000 tons. Moreover, it could carry this load with a large margin of safety in a tempest of wind that would endanger the stability of many of the adjacent buildings in New York City.

It is fortunate, judged from the æsthetic point of view, that the great structure is to be built on the suspension principle instead of the cantilever, as was at one time proposed. Apart from the much greater weight and cost of a cantilever bridge, there is by comparison everything to be said in favor of the light and graceful appearance of the suspened bridge.

The lofty and tapering steel towers, with the cables rising in a long sweeping curve to meet them 500 feet in midair will form a picture at once majestic and beautiful.—*Scientific American.*

An Electric Light for the Necktie.

The latest—and probably one of the best—novelty yet produced, is an electric light for the necktie. It consists of a small incandescent lamp mounted on a scarf pin and connected by fine wire with a pocket battery and a novel push button, which enables the wearer to illuminate the lamp at will, producing an elegant and brilliant effect. The outfit is durable, and will last for years, and its low price $1.50, has made it popular among young and even older men who care to adorn their person with something novel or elegant. An idea of the wonderful progress in electrical science is well demonstrated in the perfection of this necktie light. But a few years ago it was considered wonderful when an electric light of any efficiency was produced, even by costly and cumbersome machinery, now we use it to adorn the person and generate electricity in the vest pocket by an instrument cheaper and more reliable than a watch. These scarf pin lights can be obtained in any color or clear crystal, also in opal, which appears like a "ball of fire," and gives the best effect. It is manufactured by the Ohio Elect. Works, of Cleveland, Ohio.

The Boundaries of Alaska.

The American and English boundary lines of Alaska vary 7.3 miles and the question is naturally one that should be definitely and speedily settled as this variation if against the contentions of the United States would deprive us of the territory at the mouth of Forty Mile creek through which access is had to the valuable placer mines, at the headwaters of this stream. There have been five parties from the coast survey engaged in the work in Alaska during the summer under Messrs. Dickens and Welker. Their principal work has consisted in fixing the point where the Portland canal crosses the fifty-sixth parallel of latitude. This is the extreme southeast point of the Alaskan concession. Its location will have a great deal to do with determining the boundary line between Alaska and British Columbia. The work of last season consisted of the locating of Mount Saint Elias as on the boundary line between the two countries. Next season the more delicate work will be begun of running the line between these two points. England claims much more that the United States concedes as to this boundary. The surveys so far made tend to confirm the contentions of this country. The longitude of many other points along the coast north of the Portland canal have also been determined as a preparation of next year's work. General Duffield says there is no longer any doubt that all of the Yukon river basin below the mouth of Forty Mile creek is American territory, which includes the gold fields of that stream

McCLURE'S MAGAZINE for November comes to us this month with a very attractive feature a sketch of Abraham Lincoln the great character of the Civil War. The man who stands out in bold relief as the principal historical figure of the last half century. McClure's is the pioneer of the low price magazines and the high standard set for its articles has never been departed from since it flung picturesque pages almost gratis before an eager public. It will always be a welcome guest on every library table.

A complete and immediate revolution of transportation methods, involving a reduction of freight charges on grain from the West to New York of from 50 to 60 per cent is what is predicted in the November Cosmopolitan. The plan proposes using light and inexpensive corrugated iron cylinders, hung on a slight rail supported on poles from a cross-arm—the whole system involving an expense of not more than fifteen hundred dollars a mile for construction. The rolling stock is equally simple and comparatively inexpensive. Continuous lines of cylinders, moving with no interval to speak of, would carry more grain in a day than a quadruple track railway. This would constitute a sort of grain-pipe line. The Cosmopolitan also points out the probable abolition of street cars before the coming horseless carriage, which can be operated by a boy on asphalt pavements at a total expense for labor, oil and interest, of not more than one dollar a day.

Franklin L. Pope.

Franklin Leonard Pope was instantly killed by a shock of 3.000 volts in the cellar of his house at Great Barrington, Mass., October 13. He was the manager of the Great Barrington Electric Light Company, the principal buildings of which are at Housatonic, distant five miles. To facilitate the operations of the plant, he had placed in his cellar a large and powerful converter. When the power was turned on he visited the cellar to adjust the bearings. His family upstairs heard a heavy fall, and upon investigation found Mr. Pope dead on the floor beside the converter. Doctors say death was instantaneous.

Mr. Pope was born in Great Barrington in 1840. At an early age he was a telegraph operator. In 1860 or 1861 he came to New York, a green-looking Yankee country lad, to seek his fortune, and strayed into the Scientific American office, where employment was given him as a draughtsman. Here he gained knowledge of patents. Thereafter he entered the employment of the American Telegraph Company.

He was one of the earliest patent solicitors making electrical inventions a specialty, and for seveal years he held the office of patent attorney for the Western Union Telegraph Company. He was well known as a writer on electrical subjects. For several years past he was retained as an expert in some of the most important patent suits brought before various courts. In 1886 he was elected president of the American Institute of Electrical Engineers, of which he was a charter member, succeeding in that office the late Dr. Norvin Green. The reconstruction of the Great Barrington electric plant was one of his recent undertakings, and the work embodied many interesting features, which were described in a paper read by him at the June meeting of the Institute at Niagara Falls.

Mr. Pope leaves a widow and three children, two daughters and a son. His brother, Ralph W. Pope, is secretary of the American Institute of Electrical Engineers, and his son Henry W. Pope, is with the American Telephone and Telegraph Company in New York City. The funeral and interment was at Great Barrington.

Iron and Steel of Ancient Times.

Manufacture of iron and steel is primarily accredited to Asia and by the Aryan people. The steel now known as "Wootz" in Europe and India is the first cast steel known. It is of very superior quality and was first manufactured by the Hindoos.

From the Aryans the knowledge of the manufacture of steel spread rapidly. The date of the use of iron and steel in India for the use of swords, axes, etc., is not accurately known, but from well known facts it appears to date back many hundreds of years.

Ancient Rome traded largely with this country, sending yearly large amounts of gold in exchange for articles of iron and steel. And the most ancient national song of India mentions commanders clad in coats of iron and using iron swords.

It is recorded that King Artaxerxes Memnon presented two finely made Indian swords to the famous historian Ktesius. This was about 400 B. C. It is also recorded that Alexander the Great received from King Porus a large disc of steel.

Pliny speaks of iron and of the great attraction and repulsion of the two magnetic mountains near the Indus river. And again Ktesius speaks of the custom of thrusting swords into the ground as a means of protection against lightning.

In very ancient times, probably as far back as 1400 B. C., steel swords were regarded with religious reverence, and great prices were paid for them.

The Indian iron workers have left some remarkable monuments of their skill, prominent among these being the column of Delhi, which is a solid shaft of iron protruding from the ground twenty-two feet, and the total length of which is about fifty feet. The diameter at the ground surface is sixteen feet, four inches, and at the top twelve feet, five inches.

This column was probably constructed sometime in the fourth century. A. D., as nearly as can be judged from the Sanscrit inscription which remains legible.

For many years the column of Delhi was supposed to possess some peculiar chemical property. At last the problem was solved. The natives of the country climb frequently to its top, greasing their bodies for the ascent. The column is thus greased and rust prevented.

Cost of Strikes.

It is estimated by Labor Commissioner Wright that in all the strikes for the last seven years in the twenty-six largest industrial cities of this country, the loss in wages amounted to $35,000,000, and to the employers $29,000,000.

Casting a Bell.

The operation of casting a bell says the *Milwaukee Wisconsin*, is a most interesting one. The flask whereon and wherein the mold is made consists of two parts, constructed of boiler iron, of a general bell form, and plentifully perforated with holes for escaping gas while casting, one being so much less in size than its fellow as to give space for the loam forming the mold between the two. No "pattern," as the term is generally used, is provided, The two parts of the mold are "swept" by "formers," accurately finished from thin iron to the form ntended for the inner and outer surfaces of the bell. These "formers" are mounted and rotated over the applied loam. Five courses of loam and clay are successively applied, "swept" and baked, to complete each mold. Before this work is done, however, the inner flask is wound near the top with a rope made of hay. As the shrinkage is very great as the castings cool, difficulty would be met with in getting the flask and loam out of the nearly parallel inside top; this " pinch " is obviated by using this destructible base, which permits the collapse of the loam after the heat of the metal has consumed the hay.

The five courses laid on the flasks are: Loam, a mixture of loam. fire clay and manure; two successive coatings of powdered fire clay, and, lastly, a thin coating of brick and fire clay combined with foundry facing. Each of these coatings is baked in an oven before the succeeding one is applied. The coatings are "swept" by the formers, as applied, both in the inner and outer flasks, by careful adjustments as to thickness of materials, so that when the exterior mold is placed over the interior, a space corresponding to the intended thickness and shape of the bell shall exist. Inscriptions of embellishment to be made upon the bell are provided for with the last coating by means of a "knurl" or wheel, having the desired motto raised upon its periphery, the wheel being carefully rolled around the soft surface and leaving its imprint in the clay. Other designs are impressed from dies of the required ornament, and the usual "beading" is accomplished by notches in the edge of the sweep.

The two parts of the flask being placed together are firmly held in position by many clamps, the tendency of hot bell metal to squeeze through and force a separation of flasks being very geat. As the mold nears completion a fire is started in a near-by reverberatory furnace, in which is placed the desired charge of copper, and when the copper is melted the tin is added in its proportion. The melted metal being ready, the furnace is tapped, the bright stream caught in a huge ladle swung over the mold by a crane and poured into the open mouth of the mold until it is filled. After cooling and removal from the mold the bell is usually polished with sand and water in special revolving grinding machines. The tongue and clapper. the yoke and wheel are now attached and the whole suspended in its frame. In making a chime the bells are, after completion, temporarily set up and regularly tested by skilled bell ringers, from the permanent chiming stand of the foundry.

Economy in Boiler Firing.

The manufacturer who can cut his coalbill in two and at the same time get rid of a distinct nuisance, as a result of a few intelligent experiments, is to be congratulated and commended. He thus serves his own interests and makes a discovery which must be useful to other people also. The flour mills of Urban & Co., in Rochester, N. Y., are run by steam. A Corliss engine of about four hundred horsepower drives the machinery. The fuel formerly used was "run-of-mine" soft coal. costing this concern $2.20 per ton. But last March a series of attempts were made with mixtures of hard and soft coal of various degrees of fineness. In the end it was found that if soft coal culm or refuse be mixed with anthracite screenings, in the proportion of one part of the former to four of the latter, great economy might be effected. This stuff costs only $1.50 in Rochester, and only three-fourths as much of it in weight as of the higher-priced fuel is required to generate the same steam. This reduces the total cost just one-half. It proved, furthermore, that the smoke produced was greatly reduced—almost entirely abolished, indeed—by the change in fuel and stoking, while the accumulation of soot was so far overcome that the weekly blowing-out of the chimney is no longer necessary. A reduction in repair expenses is also reported. Messrs. Urban & Co. state that the mixed coal must be kept thoroughly wet in order to insure these results. Another essential to success with this fuel is generous boiler capacity. If boilers are forced, there will certainly be a waste of fuel and a recurrence of smoke.

Chicago's Great Drainage Canal.

The latest number of *Engineering News* contains a valuable array of information concerning the Chicago drainage canal and its probable effect on the lake level and lake navigation. It gives the report of the board of army engineers appointed to consider the subject, a paper by Trustee L. E. Cooley, the address recently delivered before the deep waterways convention by Mr. Wisner, and a description of the administration of the work by the Board of Trustees. The army engineers expressed the belief that the operation of the canal will lower the lake level as much as three and possibly as much as six inches, this compelling vessels for all time to load a little less than they would if there were no flow through the canal, but the only recommendation they made was that more thorough measurements of the discharge through the St. Clair and Niagara Rivers be ob'ained. Mr. Cooley is of the opinion that the lowering of the lake level is not likely to exceed three-tenths of a foot, or less than four inches, and he thinks such a change is a matter of scientific interest only, devoid all of practical importance. He says the level of the lakes is affected by so many natural causes, and varies so much more than four inches, the normal variations exceeding two feet, that lake vessels cannot be loaded down to such a depth as to make the diminution of four inches a serious one. A difference of barometric pressure will make a difference of a foot between the levels of Lakes Michigan and Huron, the evaporation of a dry season amounts to more than the 10,000 cubic feet per second of flow though the completed canal, and it will be many years before the canal has a flow through it of more than half that quantity. Mr. Cooley refers to the difference between the rainfall necessary to mature a crop of corn and one of small grain on the same area, and to the well-known fact that the winds sometimes make a difference of a foot or two in the lake levels. Hence he holds that a difference of four inches or less would be discovered by experts using scientific instruments, and not by vessel-owners or masters. Mr. Wisner's claim that a foot and a half or two feet of water can be permanently added to the levels of Lakes Michigan, Huron, and Erie by the building of weirs or submerged dams was regarded by the late Gen. Poe as entirely practicable.

Modern Die Cutting.

Coins, medals and a great variety of decorative metal work are shaped by means of steel dies, which formerly represented weeks of exceedingly skilful labor with chisels and queer-shaped files George F. Champney, of Bridgeport, is now producing such dies in a more rapid and, consequently, a much cheaper manner; and yet the quality of his work is pronounced by experts to be simply exquisite. Mr. Champney places a suitable block of steel, which has been heated to the right degree, under a drop-hammer, having a fall of fifty feet or so. The hammer is faced with a cast-iron mould representing the design which is eventually to be duplicated in soft metal. A solitary stroke of the hammer cuts the die. Ordinary iron is used for the hammer-block, but exceedingly delicate and somewhat exceptional methods are employed in casting it, so as to give it a smooth surface. The dies are, of course, tempered and hardened, but do not require the use of a tool on the face after the shaping blow is delivered.

The Alligator Industry.

One of the most peculiar industries in the world is the production of alligators in Florida. The attention of the United States Fish Commision has recently been drawn to it. The value of the alligator's skin in Florida is so great that they are already becoming scarce, and their ultimate extinction cannot long be delayed, unless means are taken to artificially produce them. Between 1880 and 1894, no less than 2,500,000 alligators were killed in Florida. There is also in Florida a species of true crocodile, which is hardly to be distinguished from the alligator except by the shape of its head and certain anatomical peculiarities. It grows larger and sometimes attains a length of 18 ft. In alligator farming, the eggs are hatched in incubators. They are about the size of goose eggs. The are placed in boxes of sand, and covered up. They are then exposed to the rays of the sun, and in a few days are hatched. Alligators grow very slowly; at 15 years of age, they are only 2ft long. A 12ft. alligator is supposed to be 75 years old. They are supposed to grow as long as they live.

The crocodile's egg is about the size of that of the goose.

The Last Record Breaker.

The latest record-breaking performance emphasizes the superiority of the American railway locomotive and the unapproachable enterprise of the American newspaper as compared with our foreign cousins. On the morning of the 24th ult. a "flyer" left the Lake Shore & Michigan Southern railway depot in Chicago, having on board President Webb, of the Wagner company and a few friends, and a representative of the Chicago Tribune. It left the Chicago depot at 3:29 a, m., arrived in Buffalo at 11:30 a. m., and in New York City via the New York Central at 10:15 p. m. Copies of the Tribune were in all the New York newspaper offices before 11 o'clock and the party leaving Chicago in the morning were in a theatre box in New York city the evening of the same day to witness the second act. In August one of the great English lines made a test of speed and succeeded in covering 540 miles in the remarkable short time of 512 minutes, the average speed including stops, being a fraction over 63 miles an hour.

In September a New York line started a "flyer" on the trip from New York to Buffalo, making the journey of 436 miles in 411 minutes, or at an average speed of 64:26 miles an hour. In this last race against time the distance traveled between Chicago and Buffalo was 510.1 miles. and the average speed including stops was 65.07 miles per hour. The poorest mile in this contest was covered at the rate of 92.3 miles per hour.

Baird's Improved Railroad Frog.

This improvement has proved to be all the inventor claimed for his patent. Locomotives and cars pass over smoothly, without jar or hurt to either wheels or frog. This frog once placed lasts as long as the rails themselves, therefore saving the expense of renewing and repairing which has to be done so often with the jointed frog. The many accidents which are now chargeable to the use of the ordinary frog with its sharp joints and guard rails, etc., will be things of the past when the Baird frog is adopted by all railroads as there is no place for a man to get his foot fast, nor does it require any attention to fill up or clean out at any time. Railroad men who have the Baird frog in their charge are delighted with it on account of its simplicity, exactness and durability, being the best protected part of the road always in gauge and order. The inventor is now prepared to supply railroad companies with his patent frog at a very low figure, or he will sell the right to manufacture same to parties who may prefer doing their own work. Prices on application.

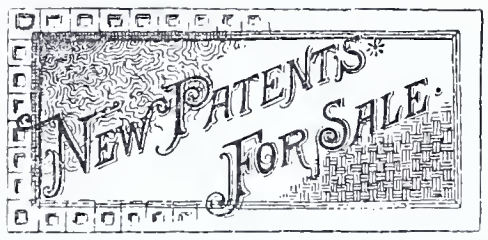
JAMES BAIRD,
Chinecto Mines,
Nova Scotia.

Encouragement to Inventors.

Young men of an inventive turn of mind should be constantly on the alert, observant in everything. Note where a saving of time or material can be effected by improved methods. If you cannot make two blades of grass grow in the place of one, invent some method to do certain things quicker and better than by present methods. Time is money, and any method by which time is saved, has a commercial value. If the operation is performed better and quicker, the commercial value of the method or means enhances accordingly. The simplest inventions are of the most value, comparatively. A recent report from the Patent Office states that the majority of successful patents were for articles that retailed for one dollar or less.—*Science News.*

The American shipbuilder has scored another success in the new steamer St. Paul; the companion ship of that splendid ocean greyhound, the St. Louis. The new steamer made an average of 20.63 knots in her trial trip, this being a little in excess of the conditions of acceptance by the government. The completion of the St. Paul adds a fourth ship to the line of magnificent steamships now crossing the Atlantic under the national flag. In a commercial sense, the American fleet of merchant marine will do excellent missionary work in giving the world an object lesson of American ability in modern ship building.

Krupp, the cannon king, has set aside 1,000,000 marks as a fund for the benefit of his employees. In addition to this he gave on Sedan day 100 Marks to each of the 1,620 veterans of the war of 1870 working for him.



Advertisements inserted in this column for 20 cents a line (about 7 words) each insertion. Every new subscriber sending $1.00 to THE INVENTIVE AGE will be entitled to the AGE one year and to five lines three times FREE. Additional lines or insertions at regular rates.

FOR SALE.—Half interest in my patents No. 525,039, for the United States and 47,893 for Canada. Collar Button Clasp and Shirt Combined, no collar button in neck band. A very valuable invention. A quick seller with large profits. Full information given on application. Address J. B. Wolgemuth, Mitchell, South Dakota. 8-11

FOR SALE.—My Coin Operated Automatic Newsboy, contains patented device for rejecting spurious coins. Effective. Device costs five cents. Will sell right to use to parties having slot machines not in competition. Address to M. M. Tomblin, Rockford, Ill. 8-11.

FOR SALE.—Patent No. 544,038. Draft Gate for Fire Doors. Will sell outright at a very reasonable price. To manufacture the same will cost only 2 cents a piece. No drilling or filing necessary. Address, H. R. Hoffman, 1004 Central Avenue, Hamilton, Ohio. 9-11

FOR SALE.—Will sell patent No. 522,872. Garden Hoe for $3,000. One person will perform as much labor with the hoe as three persons with other tools. Very easy to work. Blades replaced when worn. J. H. Andre Lockwood, N. Y. 9-11

FOR SALE.—My patent No. 458,052. Hitching Post Attachment. A great improvement over all others, has been thoroughly tested. With good satisfaction, can be attached to wood or stone posts. Copies of patent and specifications sent to any one desiring to investigate a good thing with a view to business. Address, S. B. Hopkins, Council Grove, Kansas 9-11

FOR SALE.—$1,000 will buy the entire U. S. patent to one of the most useful garden and field implements. Address, L. R. Fife, Livingston, Polk Co., Texas. 9-11

FOR SALE.—Patent No. 543,206. Gopher-Trap. Entirely new principle, the most successful catcher, simple in construction, inexpensive to manufacture, it sells on sight. Address with stamp. Albert Butzer, Deer Park, Wash. 10-12

FOR SALE.—Patent Hook and Eye. Can be inserted without sewing on the garment. Strong, neat and economical. For particulars, address, Ellen Donnelly, Hempstead, N.Y. 11-1 '96.

FOR SALE.—Patent 542,819, issued July 16, 1895. Self Fastening Saw Clamp, Can be folded so as to be carried in the pocket. Light and durable. For particulars, address, A. T. Binkerd, 126 Robinson st., Allegheny, Pa. 11-11.

FOR SALE.—Patent 544,943. Stove Pipe Joint Cover. Great Seller. Staple Article. No Stove Pipe should be put up without it. Will make royalty offer. Liberal terms. Write at once for particulars. James Woodside. 11-1'96.

FOR SALE.—A complete set of Patent Office Reports and Official Gazette of the U. S. Patent Office from 1790 to 1894. H. B. Dickinson. Ravenna, O., Adm'r of Estate of Bradford Howland. tf.

FOR SALE.—My Patent, 540,179, issued May 28th, 1895- Improved Combined Step Ladder, Clothes Rack and Ironing Table. Will sell entire interests or State rights. Address the Inventor Josiah C. Mifflin, Du Quoin, Ill. 11-1 '96.

FOR SALE.—All the necessary material for making a small dynamo, finished ready to wind, only $3.50. Send for circulars. W. I. Beecrop, Bangor, Maine. 11-1 '96.

THE INVENTIVE AGE can recommend the "Climax" watch, advertised in another column, as being, undoubtedly, the best stem-winder watch for the price in the market. It is a good time keeper, and either a plain or imitation engraved cases can be had. This watch is fully timed and regulated and fully guaranteed for one year, the same as Waltham or Elgin.

BUSINESS SPECIALS.

Advertisements under this heading 20 cents a line each insertion—seven words to the line. Parties desiring to purchase valuable patents or wanting to manufacture patented articles will find this a valuable advertising medium.

WANTED.—To Manufacture on Royalty. Or, For Sale Patents Nos. 546,882 and 546,883. Price $6,000. Dr. Gunther, Schorenksville, Pa. 11-11.

WANTED.—The Perfection Sack Tie. The best known agents wanted everywhere. Circulars and prices free, would contract on royalty or sell whole U. S. Patents. Address, J. R. Eichenberger, Patentee, Burton City, Ohio. 9-12

Electric.

IT IS positively asserted that the Manhattan Elevated Company, of New York will not introduce electricity for motive power at present.

THE electric light plant at Holton, Kas., will soon begin to supply light to the town. About a dozen Kansas towns have installed electric light plants during the present year.

AN American firm of the City of Mexico, has secured the contract for lighting the Mexican national palace by electricity. The government until recently has opposed putting in electricity, fearing danger from fire.

JACKSONVILLE, Fla., is now lighted by 118 arc lights and 300 incandescent lights, from its own plant and is furnishing to consumers 70 arc and 1,600 incandescent lights, making a total of 188 arc and 1900 incandescent lamps in use.

W. G. DECELLE has commenced injunction proceedings against Elihu Coleman, of Fondulac, Wis., and H. F. Whitcomb, of Chicago, restraining the former from transferring to the latter the Fon du Lac electric light, power and railway property.

THE statement having been made that the proposed Jungfrau road would be the highest railroad in the world. President Cable, of the Manitau and Pike's Peak Railway Company comes forth with a denial. His road reaches an elevation of 14,147 feet.

THE Metropolitan Electric Light and Power Company are placing motors in the Acme Bicycle Works, Reading Pa., to take the place of their engines. It is the intention of the firm to run their works with electricity instead of steam as heretofore.

DR. GEBHART, of Budapest, says the London Electrical Engineer, has raised an emphatic protest against the practice of putting electric incandescent lamps at a low level among the wares in shop windows. He says this is exceedingly destructive to the eyes, and that these lamps should always be put out of the direct range of vision.

THE Alley Elevated Road, the first elevated road built in Chicago, and which ran to the World's Fair, is bankrupt. It has earned this year only half of its $360,000 fixed charges. Foreclosure proceedings begin this month. Efforts are now being made to form a reorganization scheme, and an assessment of $25 is proposed. The stock is selling at 10.

IT has been announced by Frank G. Drane, general manager of the Washington, Sandy Springs & Baltimore Railroad Company, that a survey of his company's proposed line has been completed. This line, if built, will make the second electric link between Baltimore and Washington.

THE Electric Porcelain and Manufacturing Company, of Trenton, N. J., are introducing to the electrical trade a new cleat called the "Ideal," which is claimed to be the strongest ever made and the most perfect insulator. The glaze and body are simply earth, without any chemicals or metallic oxides, fused together at 6,000 degrees of heat, making a vitreous composition which does not absorb moisture.

THE proposal of the Cutter Electrical and Manufacturing Company, of Philadelphia, for settlement with creditors shows nominal assets of about $42,000, of which $14,000 is in accounts receiveable; liabilities are about $28,000. There are attachments aggregating about $8,000. It is proposed by the company to give notes to these secured creditors, with outside endorsement, and thus release the property; to pay all bills of less than $20 in cash within sixty days, and to give unsecured notes without interest to other creditors, to run 6, 12, 18, 24, 30 and 36 months, equally divided. If this settlement is satisfactory the company will proceed at once.

THE Siemens & Halske Electric Co., of America, have filed suit against the Metropolitan Elevated Railroad at Chicago, alleging that the latter is infringing patent No. 324,176, granted to Dr. Werner von Siemens in the United States on August 11, 1895, covering the electric system now in use on the Metropolitan road. President A. W. Wright of the Siemens & Halske Co. is reported as saying: "It may be asked why did we not bring suit against the General Electric Company when it operated the intramural road at Jackson Park. The answer is simple: The road was run at a world's fair under the direct supervision of the government and it was agreed should be dismantled in a certain time." Suit has also been brought against the Baltimore & Ohio Railroad Company on U. S. Patent 520,274 which covers the system of overhead construction used in the tunnels at Baltimore in combination with contact devices and a motor upon the vehicle.

Aftermath.

WINDOW glass has been advanced 2½ per cent.

ST. LOUIS is figuring on another bridge over the Mississippi river, estimate to cost $3,000,000.

THE plate glass combine has advanced prices about 4 per cent.

DURING 1895 the United States produced 170,962,607 pounds of copper, valued in New York City at $18,292,999.

OWING to the increased cost of materials the price of steel rails was advanced from $24 to $28 on the 12th of last month.

FIRE destroyed the Silver Lake worsted mills in the village of Pascoag, R. I., on the 17 ult. Loss, $90,000; insured for $75,000.

THE plant of the American Plate Glass Company, the largest in the world, at Anderson, Ind., was nearly consumed by fire on the 17th ult.

THE Council of Welsh Tinplate Workers will formally request their employers to refuse to sell black plates for tinning in other countries.

J. W. MACKAY, JR., the millionaire son of John W. Mackay, was thrown from his horse in Paris and sustained injuries from which he died on the 18th ult.

THE meeting of the Carriage Builders' National Association at Cleveland, on the 15th ult. brought over 2,000 members together. The association is now twenty-two years old.

THE launch of the two new gunboats Nashville and Wilmington, at Newport News on the 19th ult., was the occasion of an unusual naval demonstration. Admiral Bruce assembled the North Atlantic Squadron in Hampton Roads for the occasion.

THE Acetylene Light, Heat and Power Company, with a capital stock of $1,000,000, divided into 20,000 shares at $50, has perfected its organization and is now prepared to transact business at the office, 372-74 Bullitt Building, Philadelphia. This stock was offered for subscription at par and subscribed three times over.

THE General Electric Co., has been granted more time, viz., until November 16, to file evidence in the suit of the Westinghouse Co., against it for infringement of the Tesla patents; and the plaintiffs have twenty days thereafter for cross-examination. The original limit was October 7.

THE Niagara Falls Power Company has conditionally accepted the franchise offered it by the city of Buffalo. The important conditions of the acceptance are that the requirement of a 5 per cent. payment of gross receipts to the city be reduced to 2½ per cent., and that the clause of the franchise involving forfeiture, when the company is declared by the Common Council to have violated its agreement, be replaced by a clause stipulating forfeiture only after thirty days' notice of "wilful and unreasonable violation."

THE project for the introduction of a system of electric lights at the Government Hospital for the insane, at Washington, D. C., includes the establishment of two plants. The larger of these will be a 200-horse power compound Armington & Simms engine, a pair of general electric multipolar dynamos, in series for the three-wire system. The smaller plant will be a 100-horse-power Armington & Simms compound engine and a pair of general electric multipolar dynamos, in series.

A valuable utilization of the electric heating principle has been made in hospitals and sick rooms, says the Philadelphia Record. The electrotherm, or electric heating pad, has been devised to take the place of the various troublesome methods hitherto in vogue for applying and maintaining artificial heat in local applications. The electrotherm is a flexible sheet or pad, containing wires imbedded in asbestos. When these wires are connected with the socket of an electric lamp or the terminals of a battery sufficient resistance is offered to the current to produce a constant and uniform degree of heat. The heat can be kept at a uniform point for any length of time, and its temperature can be regulated with the utmost accuracy

Excursion Rates to Atlanta.

On account of the Atlanta Exposition, the B. & O. R. R. Co. will sell excursion tickets at greatly reduced rates. Season tickets will be sold every day until December 15th, good returning until January 7, 1896. Twenty-day tickets will be sold every day until December 15th, good returning for twenty days from date of sale. Ten-days tickets will be sold Tuesday and Thursday each week until December 24th, good returning for ten days from date of sale. The rates from Washington will be $26.25 for season, $19.25 for twenty-day, and $14 00 for ten-day tickets.

Correspondingly low rates from other points on the line.

"BUBIER'S POPULAR ELECTRICIAN" is the name of a monthly publication which contains a vast amount of valuable information on all electrical subjects. Its department of "Questions and Answers" will be appreciated by students and amateurs desiring information or instruction on any problem that may arise. THE INVENTIVE AGE has made special arrangement whereby we can supply that popular dollar journal and THE INVENTIVE AGE—both publications one year—for $1.00.

INVENTIVE AGE BUILDING.

PREMIUMS TO SUBSCRIBERS.

Read the following offers to new subscribers:

OUR $1 OFFER.

THE INVENTIVE AGE one year and two copies of any patent desired, or one copy of any two patents..... $1 00

THE INVENTIVE AGE one year and a list of 50 firms who manufacture and sell patented articles..... 1 00

THE INVENTIVE AGE one year and Altograph map of the City of Washington 1 00

THE INVENTIVE AGE one year and a five line (35 words), advertisement in our "Patents For Sale," or "Want" column, three times..... 1 00

For $1.

THE INVENTIVE AGE and any one of the following Scientific books:

How to Make Electric Batteries at Home, fully illustrated, by Edward Trevert.

Everybody's Handbook of Electricity, illustrated, by Trevert.

How to Make a Dynamo, by Trevert.

Practical Directions for Electric Bell Fitting and Electric Gas Lighting, by Trevert.

Elihu Thompson's What is Electricity?

OUR $1.35 OFFER.

THE INVENTIVE AGE one year and Joseph Allen Minturn's famous book "The Inventor's Friend," indorsed by such high authorities, as Dr. Gatling, Clem Studebaker and others.....$1.35
Book alone 50 cents.

THE INVENTIVE AGE one year and any one of the popular and instructive books as per offer in another column, under heading of "Popular Scientific Books."..... $1.35

THE INVENTIVE AGE one year and any one of the "Excelsior Edition of Standard Poets," mentioned elsewhere in this magazine..... $1.35

THE INVENTIVE AGE one year and a copy of "Picturesque Washington," 260 pp., 136 illustrations, Stilson Hutchins' famous book, former price $2, sent to any address in the United States..... $1 35

THE INVENTIVE AGE one year and The Peoples' Atlas of the World, one of greatest bargains ever heard of; size of Atlas 14 x 22 open; latest maps and statistics; handsomely illustrated, a $2 book with AGE one year—both for.... $1 35

☞See another column for other offers.

OUR $1.50 OFFER.

THE INVENTIVE AGE one year and Robt. Grimshaw's famous book "Tips to Inventors"..... $1 50

Address all communications to
THE INVENTIVE AGE,
Washington, D. C.

Cantwell & Company, Patent Agents, Calcutta, India.

We have received from this well-known and long established firm in the east their handy little phamphlet which deals fully with the laws and regulations appertaining to the taking out of Patents and registering of Trade Marks in India and other Eastern countries. It will be found a very useful adjunct to the file of Patent Agents in this country and more so to those in this city, the headquarters of the fraternity. The manual contains a list of charges which we think are very moderate, and, which will we feel sure fill a long felt want in that direction.

A junior member and representative of the firm, Mr. Harry Cantwell, is at present in this city which he proposes to make a permanent residence.

All communications to him with reference to any information regarding Patent Practice in the East may be directed in care of the Inventive Age office, Washington. We may add that the above firm are the sole agents for the "Inventive Age" in India, British Burmah and Ceylon.

Want a Fountain Pen?

One of the very best in the market, a standard article, warranted, will be sent as a premium with THE INVENTIVE AGE. The retail price of the pen is $2.75. We will send the AGE one year and the pen for $2.75.

SUPPLEMENT.--Tips to Inventors.

The Infancy of Invention.

As capital is constantly being invested and expended to protect and preserve capital previously expended and invested in various enterprises all over the land, so will inventions continue—their variety and multiplicity being demanded to further the usefulness and perfection of inventions previously originated.

It was Edison who, replying to the question, "Do you think that the inventions of the next fifty years will be equal to those of the last?" said: "I see no reason why they should not. It seems to me that we are at the beginning of inventions." The truth of this prediction is illustrated in the many useful and wonderful achievements of Mr. Edison's own laboratory since giving utterance to this statement only a short time ago.

Profits from Invention.

The value of an invention is determined by no fixed rule. Fabulous sums have been made from simple and novel, as well as complex and useful, inventions. It is a fact that four-fifths of the business of the United States is transacted by the use of inventions. The benefits to mankind because of inventions, are so manifest and so common we are apt to look upon them in a matter-of-fact sort of way and fail to give the inventor the credit due him. In the majority of cases, however, the failure of an inventor to reap a reward is attributable to his own negligence, lack of forethought and indiscretion.

Nearly every human being is an inventor, but only a few obtain a *monopoly*—a patent—on the product of their brain. There are thousands of really useful articles, appliances and discoveries, in use every day by millions in all walks of life, that might have been patented had the inventor possessed the business sagacity that has actuated his more fortunate neighbor. Take for instance the open slot necessarily used in all conduit electric, or cable street railway systems. The inventor failed to get a patent on the idea and a fortune missed him.

There is money in inventions, but not always for the inventor.

The only way to make money out of an invention is through the protection afforded by a patent; not a patent in name only, but a *good patent*—one that is intelligently drawn, with claims commensurate with the scope and importance of the invention.

The profits arising from inventions in the electric field during the past twelve years have been simply astounding. In railway appliances, bicycles, typewriters, telephones, cash registers, slot machines and farm machinery, the field has been equally remunerative. And just think of that simple toy "Pigs in the Clover"—it netted the inventor, whose friends laughed at him for obtaining a patent on so simple a toy, over $150,000. The inventor of the metal plates to be attached to the worn heels of shoes (for sale in all cities) realized a fortune out of it amounting, it is said, to nearly $1,000,000. Perforated wooden seats for chairs and rubber tips for lead pencils brought the inventors big results. Howe made a million dollars from his sewing machine attachments, and the inventor of that simple lamp attachment, the inverted glass bell, to be suspended over lamps to protect the ceilings from being blackened, made the inventor rich. The "Darning Weaver," a device for repairing stockings, is a useful invention and is netting the inventor a handsome revenue on royalties. The wire nail and gimlet-pointed screw are fortune makers, and wire nails caused the invention of automatic machinery that manufacturers them so cheaply it does not now pay the carpenter to spend his time in picking a nail up when it drops, if it requires ten seconds to do so. The inventor of the well-known "safety pin" lived in luxury all his life, after discovering a means of concealing the point of a pin in such manner as to prevent scratching. The inventor of roller skates made nearly a million and the inventor of the needle-threader for a long time made $10,000 a year.

Relation of Capital to Invention.

Mr. Edward P. Thompson, one of the most entertaining writers on the subject of invention, says that "every invention, before the introduction into practical use, passes through two stages; namely, mental and physical"—mental when in the mind of the inventor only, and physical when the mental invention is put into bodily form by hand, or by hand with the assistance of a convenient tool. "A mental invention," says the writer, "sometimes does not become a physical invention because the inventor lacks money, technical knowledge or diligence. Such a mental invention often becomes a physical invention by the assistance of a capitalist, an educated person, or diligent companion." This being true the *mental* inventor, the person who, for lack of means possibly, would fail to make his invention a physical reality—such a person should take into his confidence a friend or companion to share the prospective benefits of his invention. Thousands of meritorious mental inventions are never worked out because of the over-timidity of the inventor, his exagerated greed for *all* the benefits to accrue instead of half the loaf, which in many instances is, or would have been, ample reward. Mr. Thompson truly says: "Inventors and capitalists should be more willing to co-operate. It is too often the case that the former must pay for his own experiments and all patent costs before a capitalist will even take the trouble to look into the merits of the alleged invention. On the other hand it is too often true that the capitalist seeks to join with the inventor, but the latter wants too high a price at the beginning."

Who Can Apply for Patents.

Patents are issued to any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or new and useful improvement thereof, not known or used by others in this country, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned; and by any person who, by his own industry, genius, efforts and expense has invented and produced any new and original design for a manufacture; any new and original design for the printing of fabrics; any new and original impression, ornament, pattern, print or picture to be printed, painted, cast, or otherwise placed on or marked into any article of manufacture, or any new, useful and original shape or configuration of any article of manufacture, the same not having been known or used by others before his invention or production thereof, nor patented or described in any printed publication, upon payment of the fees required by law and other due proceedings had.

If it appears that the inventor, at the time of making his application, believed himself to be the first inventor or discoverer, a patent will not be refused on account of the invention or discovery, or any part thereof, having been known or used in any foreign country before his invention or discovery thereof, if it had not been before patented or described in any printed publication.

Joint inventors are entitled to a joint patent; neither can claim one separately. Independent inventors of distinct and independent improvements in the same machine can not obtain a joint patent for their separate inventions; nor does the fact that one furnishes the capital and another makes the invention entitle them to make application as joint inventors, but in such case they may become joint patentees. The receipt of letters patent from a foreign government will not prevent the inventor from obtaining a patent in the United States, unless the invention shall have been introduced into public use in the United States more than two years prior to the application. But every patent granted for an invention which has been previously patented by the same inventor in a foreign country will be so limited as to expire at the same time with the foreign patent, or, if there be more than one, at the same time with the one having the shortest unexpired term, but in no case will it be in force more than seventeen years.

Protection to Inventors.

What is a patent? It is a monopoly or grant, in the United States, for a term of seventeen years, to the patentee, his heirs or assigns, of the exclusive right to make, use and vend the discovery throughout the United States, as the inventor's rights may appear in the specifications and patent granted.

This means a great deal to the inventor who has secured a *valid* patent containing all the claims so worded as to prevent infringement and loss in contest. Thousands of inventors, obtaining patents through unreliable and inefficient attorneys or agents, find themselves possessed of patents *in name only*, and of no value when combatted by infringers with capital and the aid of able legal talent. A good patent costs no more than a weak and worthless one. Therefore how shortsighted are those inventors who employ cheap attorneys, saving $5 or $10 in fees, only to find themselves loosers of *all* they have paid when the contest comes.

The Need of Reliable Attorneys.

The Revised Statutes of the United States provide that "before any inventor shall receive a patent for his invention, he shall make application therefor in writing to the Commissioner of Patents, and shall file in the Patent Office a written description * * * of the same in such full, clear, concise and exact terms, as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct and use the same; and in case of a machine, he shall explain the principle thereof and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions."

To carry out these provisions it is necessary for the inventor to first make a clear, concise and complete drawing, or a working model of his invention or discovery, and send it to THE INVENTIVE AGE, or some thoroughly reliable attorney, who, before making application for the patent, should make a thorough and rigid examination of the Patent Office to determine upon its novelty or patentability. If the invention has been anticipated by some one else, or if it lacks novelty, or if for any reason a patent can not be granted, or, if granted, would be of no worth or value, then the inventor does not want to incur the expense of making application and paying attorney's fees and government fees. For making this thorough examination THE INVENTIVE AGE and all reliable attorneys charge $5, which fee is, under some circumstances, however, taken out of the additional fees paid by the inventor in case letters patent are applied for. The fees of patent attorneys vary somewhat, but the average fees for obtaining a United States patent are about $65—the government fees being $15 on filing the application and $20 on issuing a patent—the balance being the fees for preparing specifications, making searches, etc. The inventor is sometimes favored in terms given for payment of the fees, more detailed information regarding which can be obtained by enclosing a 2-cent stamp with enquiry to THE INVENTIVE AGE, Washington, D. C. The reason why the inventor should have a preliminary examination of the Patent Office made before applying for a patent lies in the fact that if the case is rejected the fees paid to the government and the attorney are lost

All patents obtained through us will receive special mention in THE INVENTIVE AGE and in cases of unusual merit inventions will be illustrated free of charge to our clients.

This publication, reaching capitalists, manufacturers and business men throughout the world, is of value in assisting to bring an invention before the public in case its promotion or sale is desired by the patentee.

And What Do You Think of This?

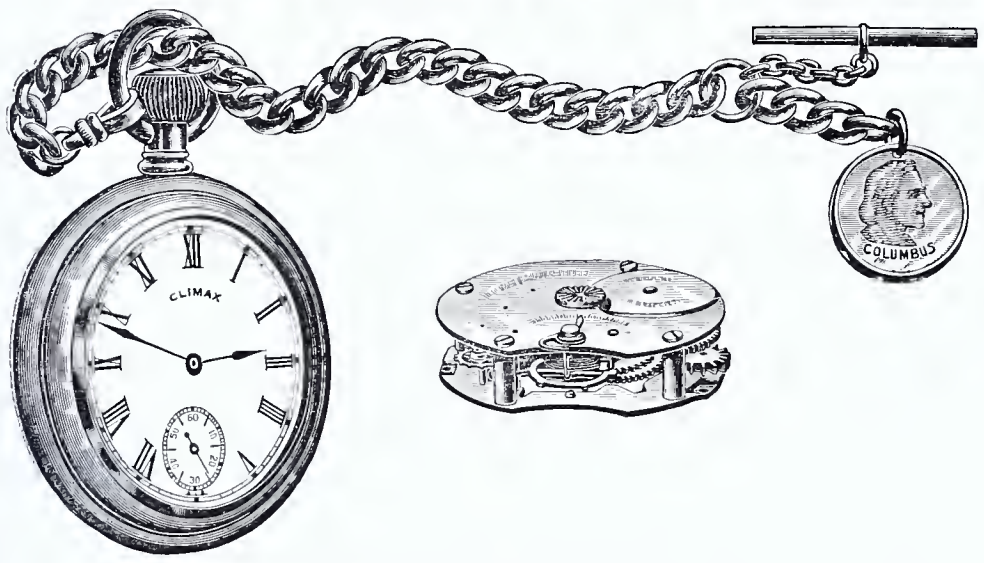
JUST OUT! BRAND NEW! ENTIRELY ORIGINAL!

$2. An American Stem-Winder.

A DUPLICATE IN QUALITY, APPEARANCE SIZE, ETC., OF ANY AMERICAN WATCH SOLD FOR LESS THAN $10.00

Our Watches are Positively and Unequivocally Guaranteed.

THE CLIMAX



EITHER ARABIC OR ROMAN DIAL.

This is the CLIMAX up to date. It represents the most important step taken in Watch evolution in many years. It describes a line beyond which nothing radical will pass for years, not only in the matter of PRICE, but QUALITY. The movement comprises many original patented features, and has been for years the subject of constant labor by one of the foremost of the foremost of expert and inventors.

DESCRIPTION.

CASES.—Two Styles, Plain and Imitation Engraved. Two Finishes, Solid Gilt and Nickel. Two Dials, Roman and Arabic. Snap Back. Heavy Bevel Crystal. Regular Stem Wind. Inside Stem Set. Regular 18 size Case. Chains assorted in each dozen.

MOVEMENT.—Regular American Lever, Lantern Pinion, Quick Train, 240 Beats per Minute Three-quarter Plate, Short Wind, Runs 30 hours to one winding. Dust Cap over Movement.

Fully Timed and Regulated, and FULLY GUARANTEED for one year, the same as Waltham or Elgin.

The Cheapest Stem-Winding Watch Ever Produced.

PRICE $2. With "THE INVENTIVE AGE" one year, $2.50.

JUST PUBLISHED.

How to Build a One-Fourth Horse-Power Motor or Dynamo.

By A. E. WATSON.

Illustrated with full working drawings.

PRICE, PAPER, 25 CTS. CLOTH, 50 CTS.

Address "INVENTIVE AGE," Washington, D. C.

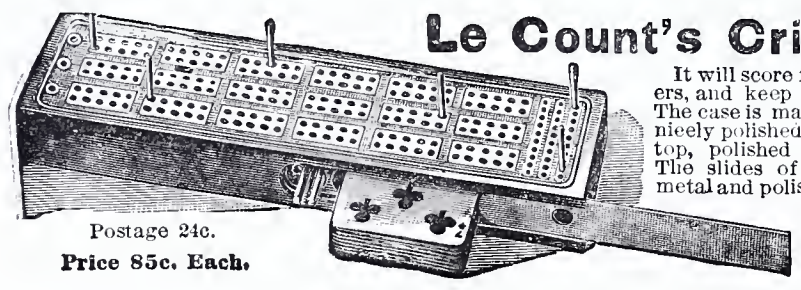
THE STAR FOUNTAIN PEN.

A solid 14 karat gold pen in highly finished hard rubber holder. The only fountain pen that will give perfect satisfaction, sold at less than $2.50. We warrant it in every particular and refund money when it is not satisfactory. A gold pen alone of the same value costs in any retail store more than we charge for the whole outfit. Writes 25 pages fools cap to one filling.

By mail, **$1.50** each; **$12** per dozen.

With "Inventive Age" one year, $2.

Le Count's Cribbage.

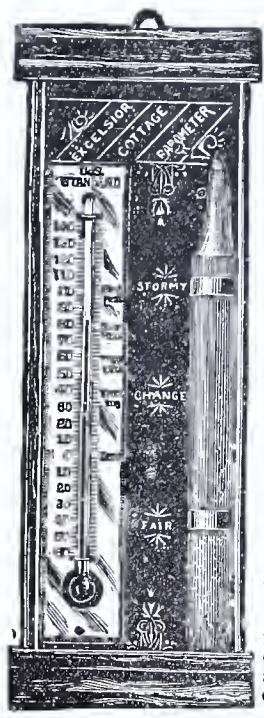


It will score for three or six players, and keep tally of the games. The case is made of black walnut, nicely polished; has a solid metal top, polished and nickel plated. The slides of compartments are metal and polished. This Board is superior to Boards that sell for three times the price. Full directions with each Board.

Postage 24c.

Price 85c. Each.

With "Inventive Age" one year, $1.60.



THERMOMETER & BAROMETER COMBINATION.

Combination Barometer and Thermometer.—Our well known leader. Blue and Gilt back with metal side posts. Fancy top and bottom and handsome enough to decorate the home of a millionaire. Extra well made and dependable on for showing changes in both weather and temperature. One of the biggest bargains in our list. A handsome thermometer, together with a glass tube containing a chemical preparation which rises and falls by action of the atmosphere, foretelling correctly all changes in the weather. This is a new style storm glass and the most reliable ever known, being in use in all signal service stations. The slightest change in the atmosphere in some way affects this glass. The thermometer is also of the best quality. Both are enclosed in a stand with walnut top and bottom and blue and gilt back. On either side is also a strong metal bar giving the whole great strength and adding to its appearance. Altogether it is a most remarkable combination for the price and we take pleasure in offering it to our patrons

This is not one of the many cheap combinations of which the market is flooded which are neither good for ornament or use and can never be relied upon to forecast either the weather or in fact any thing else.

There is no reason for you to depend on the weather Bureau reports as every person who owns one of our Combinations, can make his or her forecast and tell exactly when it will be fine, rainy and in fact every change in the weather. With this you can tell whether to put on rubbers and a mackintosh or a pair of summer shoes and a costly dress. Don't take any more chances about the weather but be prepared. Each one packed securely in a neat box so that they can be mailed up without any fear of getting broken or damaged. Postage 10c. **Price 32c. Each; $3.00 Doz.**

With "Inventive Age" one year $1.25.

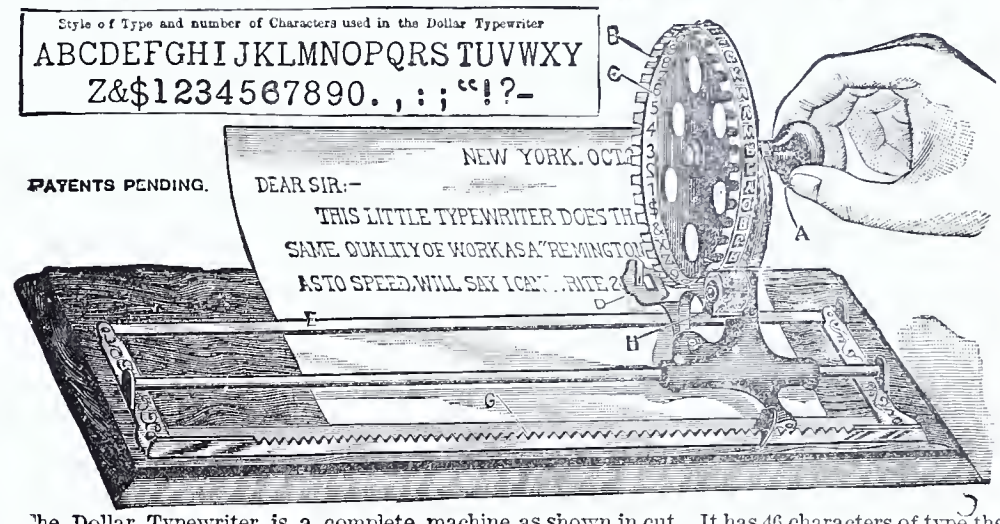
THE DOLLAR TYPEWRITER.

A PERFECT TYPEWRITING MACHINE.

Price only $1.00 by Express; $1.15 by Mail.

Style of Type and number of Characters used in the Dollar Typewriter

ABCDEFGHIJKLMNOPQRSTUVWXY
Z&$1234567890.,:;"!?-

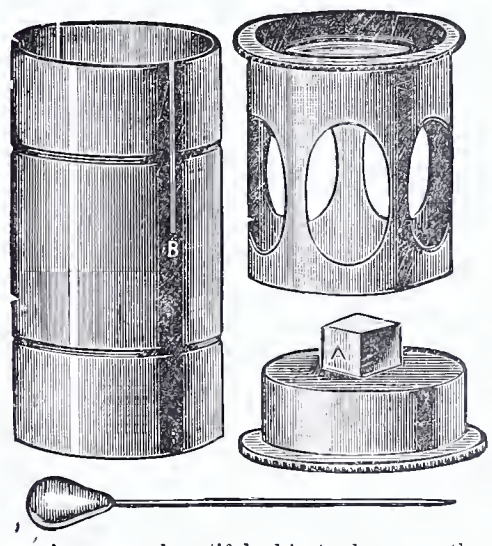


The Dollar Typewriter is a complete machine as shown in cut. It has 46 characters of type the same as that used on a Remington. It is provided with numerous patented devices for inking the type, holding the paper, spacing and governing the impression and allignment. It will write a postal card, note or full letter sheet and is particularly well adapted to addressing envelopes. It is a practical illustration of what a rare combination of ingenuity, skill and capital may do as it embodies many difficult and expensive mechanical movements which were heretofore only possible in high price machines. Over a **QUARTER MILLION** of these machines have been sold within the last year and the secret of its great success is that the manufacturers commenced with a foundation of original ideas and then spared no expense in putting them to practice by the use of the best machinery to be devised. If no more could be said of it this Typewriter is worth many times its cost as an instructor of children teaching and amusing at the same time, but its features of practicability commend it to the use of nearly everyone and the sale it has had and will have is not surprising. It **IS A PERFECTLY CONSTRUCTED** machine that will do work equal in quality to any of the high priced machines. It is so **SIMPLE** that a **CHILD CAN OPERATE IT** and will not get out of order. It is **LIGHT** and **PORTABLE**—just the thing for travelers. It is very **ATTRACTIVE** in appearance, made entirely of metal, mounted on a highly polished hard wood base. It will **WRITE RAPIDLY** with practice—15 to 25 words a minute. We **GUARANTEE** every claim for it, and if not as represented **REFUND MONEY.** The **PRICE** is but **ONE DOLLAR!** This is the age of typewriters, and no one should be without one.

Any typewriting that may be done with any of the high priced machines, from $100.00 down may be done with this one. It is now possible for **EVERYONE** to own a Typewriter and address and write their letters, postals, etc., in the same way the richest firms do theirs. The monopoly in Typewriters died when **"THE DOLLAR"** was born. Postage 15c. **Price $1.00 Each.**

With "Inventive Age" one year, $1.75.

COMBINATION MICROSCOPE.



Scientific skill and the greatest perfection in workmanship coupled with a very high magnifying power, distinguish this handsome microscope over all others ever offered at popular prices. It is specially imported from France, and readily sells for one dollar at retail. As regards power and convenience of handling, good judges pronounce it the best ever introduced for popular use. The cylindrical case is manufactured from highly polished brass, while there are two separate lenses—one at each end of the microscope. The larger glass is a convex magnifier, adopted for examining insects of various kinds, the surface of the skin, the hair, fur or any small articles. It will magnify the hairs on the hands or arms till they resemble large ropes, and it is a most interesting companion. The other lens is exceedingly powerful, and will clearly delineate every small object, entirely invisible to the naked eye such as the animalcules in a drop of water, fishes, feathers and the minutest insects. An interesting illustration of its great power may be had by placing a drop of sour flour paste upon the bottom of the lens, when on looking through the eye-piece, the sight of the writhing mass of thousands of worms, snakes and eels, is one never to be forgotten. Thousands of living animalcules can be seen in a single drop of stagnant water. An insects eye is a very beautiful object when seen through this microscope. It reveals hundreds of small eyes or six sided facets resembling net work or honeycomb, which enables the insect to see in all directions without moving its head. There are 4,000 of these little eyes in the single eye of a fly. It is invaluable in detecting adulterations in food, such as flour, tea, coffee, sugar, spices, milk and the fatal trichina spiralis or pork worm. Postage 3c. **Price 47c. Each.**

With "Inventive Age" one year, $1.35.

$1,000 REWARD

To every inventor taking out a patent through our office. For particulars and a 79 page excellent hand-book for inventors, inclose stamps and address **The American Patent Market and Novelty Works,** ST. PAUL, MINN Mention this paper. A. M. CARLSEN, Prop.

PATENTS.

For eleven years I have devoted my time exclusively to the preparation and prosecution of applications for PATENTS, TRADE-MARKS and COPYRIGHTS, to the management of interferences, to rendering opinions as to scope and validity of patents, to making preliminary searches, and to attending to all matters relating to patents or inventions. Highest references in all parts of the country. Send for hand-book on patents.

RHESA G. DuBOIS,

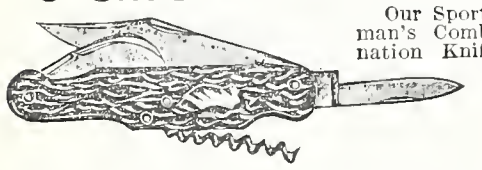
Inventive Age Building. WASHINGTON, D. C.

BURGLAR ALARM.

Is it worth anything to know that your door is closed against the smartest sneak thief every night? This Alarm will give you that feeling of security. He may pick or break the lock, but he don't open the door without setting off the Alarm. Its simplicity accounts for its low price and its value. It winds like an Alarm Clock and is closed into any doorjam without injury to woodwork. When the door opens it drops, suspended by string, and goes off with loud ring. Postage 5c. **Price 68c. Each. $7.20 Doz.**

With "Inventive Age" one year, $1.50.

SPORTSMAN'S KNIFE.

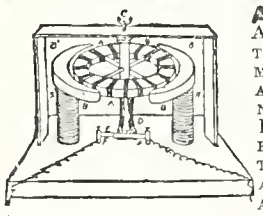


Our Sportsman's Combination Knife.

Genuine heavy stag handle with three blades, one large clip blade, one medium, one short and one curved, all in finest crocus polish, also has corkscrew, milled scales, brass lined, German Silver shield, one of the handsomest and most durable knife we have ever offered. Postage 5c. **Price 95c.**

With "Inventive Age" one year, $1.40.

ELECTRO MOTORS; HOW MADE AND HOW USED.



A HANDBOOK FOR AMATEURS AND PRACTICAL MEN BY S. R. BOTTONE. AUTHOR OF "THE DYNAMO," "ELECTRICAL INSTRUMENT MAKING FOR AMATEURS," "ELECTRIC BELLS," ETC., ETC. AND A. M. A. BEALE, AUTHOR OF BEALE'S CALISTHENICS, ETC.—A complete and simple explanation of the source of the power in a dynamo and the method of applying the same, commencing with a Simple Motor, and proceeding to an exposition of the Siemen's, Thompson's, Walker's, Grison and other motors.

In addition three special chapters by an American author follow in which the information embraces all American improvements. The work is probably the most complete and easily understood of any of the many now in the field

180 PAGES, CLOTH, PRICE..... **75 cts.**

With "Inventive Age" one year, $1.50.

Just Published.

Standard Electrical Dictionary,

By Prof. T. O'CONOR SLOANE,

Author of "Arithmetic of Electricity," Electricity Simplified." Electric Toy Making." Etc.

624 Pages. 350 Illustrations. Handsomely Bound in Cloth, 8vo, Extra Super Calendered Paper, **$3.00.**

The large sales of the author's previous works, and the flattering reviews they have received from all sources, together with the great demand for a Dictionary of this kind, have led Prof. Sloane to complete, after a vast amount of labor, a work of a very high standard.

In publishing the "Standard Electrical Dictionary," we have adhered to what the work purports to be, exhausting the subject of electrical terms, giving each title the clearness of explanation necessary to make the understanding of it complete, without unnecessary elaboration. In this work, every electrical word, term, or phrase will be found intelligently defined.

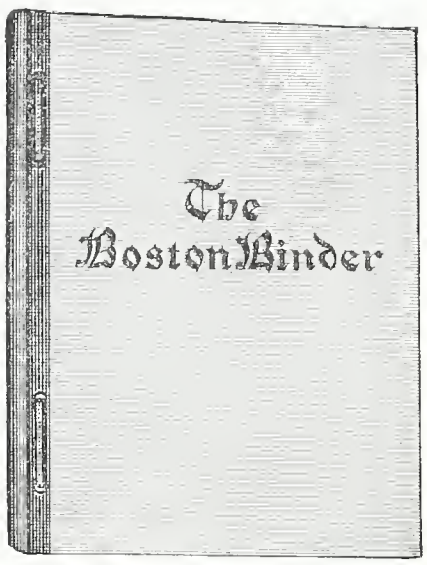
The work is absolutely indispensable to all in any way interested in "Electric Science," from the higher electrical expert to the everyday electrical workman. In fact, it should be in the possession of all who desire to keep abreast with the progress of the greatest science of the times.

PREPAID TO ANY ADDRESS ON RECEIPT OF $3.00.

Address,
THE INVENTIVE AGE,
Washington, D. C.

Bind "The Inventive Age."

It is the best binder ever invented. It takes only half a minute to insert the paper, and thereafter it is kept clean, and can always be found when wanted. A single binder will hold an entire year's issues of the AGE. When it is complete it can be filed away in your library as a most valuable book of reference for the year 1895.



The Binder is very inexpensive. We send it postpaid on receipt of only **thirty cents**, cash or stamps. It makes all the difference between lost, torn, and dirtied papers, scattered about the house in such confusion that you can never find what you require, and a handsome orderly file which becomes at the end of the year a volume for your library certainly worth from $1 to $3.

To insure a copy of the new Boston Binder to every one of our subscribers, we make the following liberal offer:

FIRST. On receipt of fifteen cents with your renewal to pay for postage, packing, etc., we will send the Boston Binder **free.**

SECOND. To any old subscriber who sends us **one new subscription,** we will send the Binder **free of charge.**

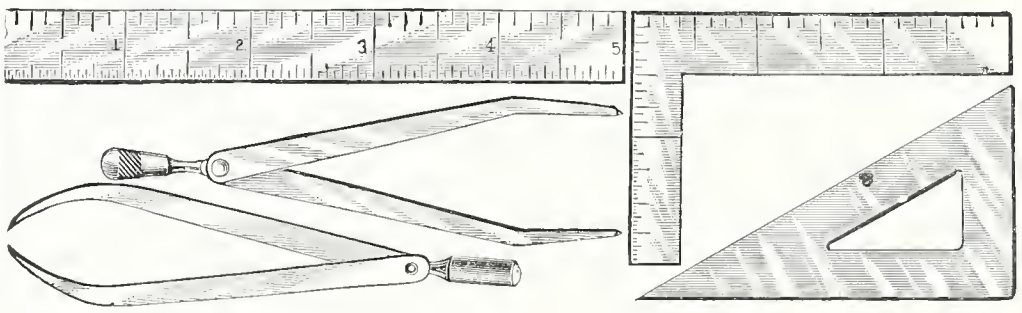
THIRD. Any old subscriber who renews his subscription and sends us **two new subscriptions,** we will send a Binder **free** to each party.

These are very generous offers, but we want every reader of the AGE to preserve his paper, and we are willing to contribute a little ourselves toward this end.

Send your orders in at once for the new Binder.

"INVENTIVE AGE," Washington, D. C.

NICKEL-PLATED STEEL TOOLS.



These articles are made of the finest steel, polished and plated in the best possible manner and are for all practical purposes equal to similar goods sold in stores at five times the price. The well known high prices of such goods, has induced us to manufacture them in large quantities and to furnish them at prices at which every one can afford to buy. They are useful in the household and indispensable in every office and store. In fact no one should be without them.

By mail, **15** cents each; **$1.20** per dozen. Set of 5, **60** cents.

With "Inventive Age" one year, $1.

The Norris Peters Company,

Photo-Lithographers,

458-460 Penn. Avenue, Washington, D. C.

Special attention given to the reproduction and printing of copies on parchment, drawing-paper, tracing-linen, and cardboard, of Patent Office drawings for attorneys to accompany application for patents in foreign countries.

THE AMERICAN PRESS CLIPPING CO.

District Title Building, Washington, D. C.

Please send till further orders, newspaper clippings about myself and on the following subjects:

.....

.....

For which I agree to pay monthly as follows: $1 a month for 25 (or less) clippings; 4 cts. each up to 200 in a month, and 3 cts. each for all over that number, a month.

Name.....

Address.....

C. J. STOCKMAN, Inventive Age B'ld'g, Washington, D. C.
F. E. WELCH, 20 Kimball House, Atlanta, Ga.

STOCKMAN & WELCH,

EXPERTS IN PATENTS,

All work attended to promptly and faithfully

Correspondence Solicited.

Our clients will have the privilege of placing a model of their invention on exhibition in our section in the Atlanta Exposition to be held in 1895, without cost to them.

Washington, D. C.

Atlanta, Ga.

PATENTS OBTAINED.

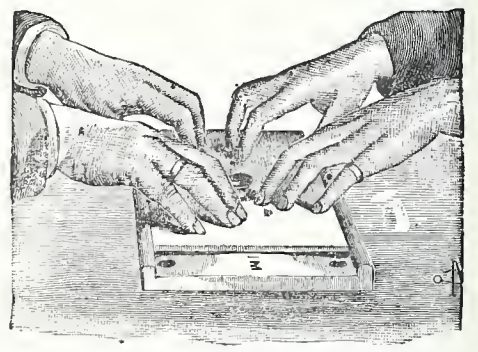
E. W. ANDERSON & CO.,

Counsellors at Law,

700 7th Street, WASHINGTON, D. C.

Examinations without charge.
Inventor's Guides free.

GENII OR TALKING BOARD.



This wonderful discovery, based on the mysterious powers of human magnetism, answers all questions on any subject, in the most accurate and marvellous manner. How and why it does this we cannot explain; yet when the Board is set between two persons, and their fingers are placed on the little magnetic table, set upon the Board, the little table will soon commence to move, faster and faster, talking or answering questions rapidly, by touching the printed words or letters on the Board. It works with surprising speed, and will answer every question on all topics—political, religious or social. It will tell your fortune, guide you in business matters, and inform you as to your future husband or wife; tell whether you are to be rich, live long, etc.

The GENII is a marvel, astonishing all who try it. It is a handsomely polished Board, covered with words and letters, and with the magnetic table, is packed in a strong box. Postage 25c.

Price 60c. Each; $6.00 Doz.

With "Inventive Age" one year, $1.75.

SPRING BALANCE SCALES

Spring Balance. An old favorite. Will weigh anything under 24 pounds. The best quality yet produced. Elegantly finished and accurately made and sealed off. Great value! Postage 6c.

Price 12c. Each; $1.28 Doz.

With "Inventive Age" one year, $1.

WM. DUFFY,

REGISTERED

Plumber and Gas Fitter,

1130 N. CAPITOL ST.,

WASHINGTON, D. C.

ESTIMATES FURNISHED

Orders by mail will receive prompt attention.

D. BALLAUF,

Practical Mechanician,

(Established 1855.)

Constructor of Light Machinery, Experimental and Model Work.

All orders for Certified Duplicates of Patent Office Models, and Models of any Foreign Patents from Drawings and Specifications, filed in the Library of the Patent Office for law suits in case of infringement; also, Original Models for Inventors, and Models to complete application for Patents, from Drawings and Specifications filed in the Patent Office.

731 7th Street, N. W., WASHINGTON, D. C.

The Inventive Age
AND INDUSTRIAL REVIEW
A JOURNAL OF MANUFACTURING INDUSTRY AND SCIENTIFIC PROGRESS

Sixth Year. No. 12. | WASHINGTON, D. C., DECEMBER, 1895. | Single Copies 10 Cents. $1 Per Year.

Improvements in Engine and Dynamo Building.

The J. H. McEwen Mfg. Co. of 26 Cortlandt street, New York, the well known builders of automatic engines, have entered the electrical field and are building dynamo electric machinery in connection with their engine business.

Their high speed engines, which have been in market for about four years, have gained an enviable reputation as high grade engines. They claim that for direct connected apparatus much better results can be obtained when both engine and dynamo are built by the same company, assembled and thoroughly tested before leaving the works. Then again all parts can be standardized, and made duplicate, and can be turned out at less cost, than it is possible when the engine is built by one company and the dynamo by another in widely different localities. The complete machine, having been thoroughly tested at the works, insures quick and satisfactory starting when it reaches its destination. This feature will be appreciated by those who have had experience in this line.

Figure 1 shows an interior view of their machine shop, a steel structure built by the Shiffler Bridge Co., of Pittsburg, Pa. The central part, 60 feet wide is spanned by a twenty ton electric traveling crane, having thirty feet clear head room, and runs the entire length of this room, which is 260 feet. Within this area all the heavy machines are located. On either side is a wing 30x260 feet long, the second floors or galleries of which are equipped with light tools, vice-benches, etc.

This company has made some recent improvements in the details of their engines, notably in the governor and cross head. Figure 2 is a cut of their Governor, which is extremely simple, having but one bearing, and that a roller pin bearing, which requires no lubrication, so that the want of lubrication will not effect its regulation, and as the spring is the only part that is adjustable, there can not be any trouble from misadjustment. The engine must regulate nicely, as the builders state they have given the following guarantee with every engine that they have sold, and have in no case failed to meet it.

Guarantee.—The engine shall not run one revolution slower when fully loaded than when running empty, and a reduction of boiler pressure from the greatest to that necessary to do the work, will not reduce the speed of the engine one revolution. Any engine failing to meet this guarantee, becomes the property of the purchaser, upon payment of one dollar.

Figures 3 and 4 show the construction of their cross head. The shoes are held in position by eccentric bolts. To adjust position of shoes for wear, it is only necessary to loosen nut and turn the eccentric bolt to such an extent as is necessary to give proper adjustment. Then tighten nut, and it will remain in that position. It will be noticed that shoes swivel on the eccentric bolts, so that it is impossible for shoes to have anything but a full bearing. Both upper and lower guides, as well as cross-head pin, are oiled from stationery sight feed oil cup on top of frame. The oil is wiped off by upper shoe, and is caught in oil groove shown, extending across face of shoe, and led through oil holes at each end of grooves to inside of upper shoe: thence to a funnel-shaped oil hole in strap of cross-head box to cross-head pin; from there it drops to lower shoe and then through holes in this shoe to lower guide.

The shoes are faced with genuine babbit which is put on in such a manner that it is as solid as though it was part of the shoe itself.

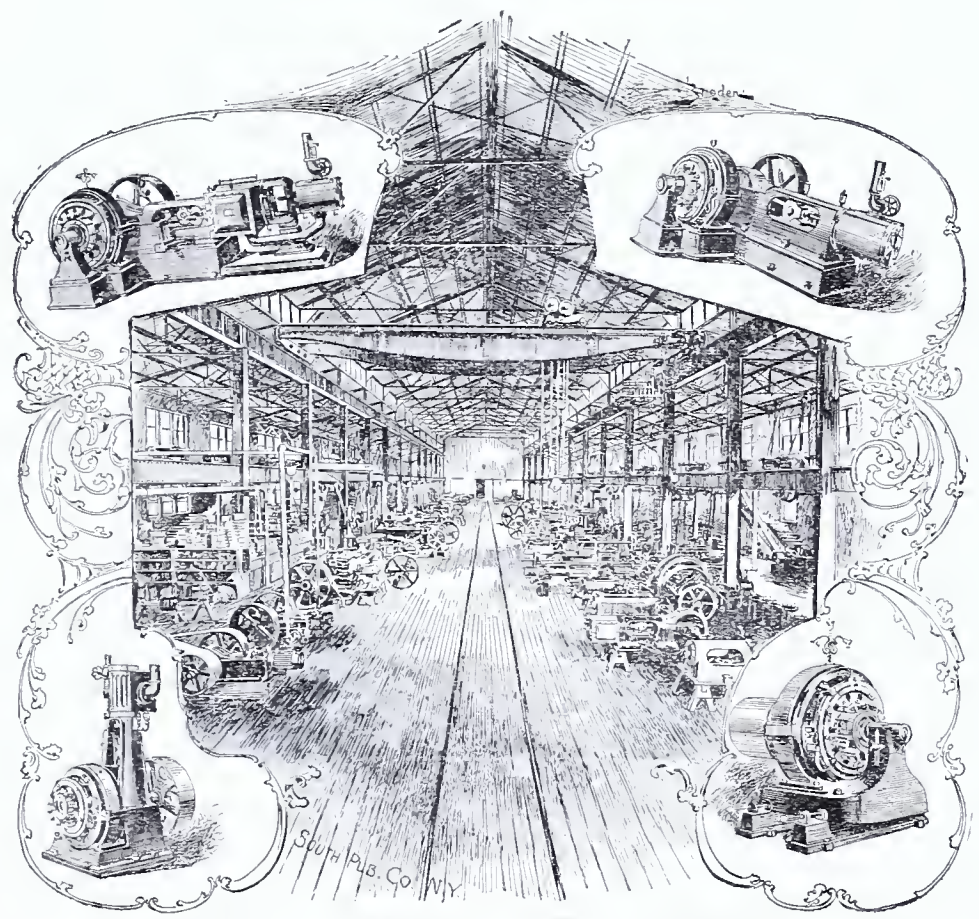


Fig. 1.—INTERIOR VIEW OF MACHINE SHOP, McEWEN MANUFACTURING CO.

The Thompson-Ryan dynamo represents a radical departure from the beaten tracks of dynamo design, differing in nearly every detail of construction from the ordinary type of machine. The most important is a set of series windings surrounding the armature, and termed balancing coils. This feature, which is the invention of Prof. Harris J. Ryan, of Cornell University, was introduced for the purpose of balancing armature reaction and carefully conducted scientific tests show that it accomplishes the desired end perfectly. Having no armature reaction to contend with the designers of the Thompson-Ryan dynamo have been able to introduce into their designs many important features never before possible. At first thought it would seem that the addition of balancing coils to a dynamo would complicate the construction to a certain extent, and so it would if applied to the ordinary type. But all this is fully off set by the simplification of the machine in other respects. The field castings of these machines are of steel and consist of but three pieces which are held together by four bolts. One of these castings is the "pole-ring," shown in Fig. 5, through which the balancing coils are wound, and the other two constitute the field ring proper, Fig. 7.

The balancing coils are wound in such a way that the current passes through them across the pole face in the opposite direction from the currents in the armature conductors, and thus the magnetic effects of the armature currents are neutralized.

Fig. 6 is a view of the completed pole ring. The field ring, Fig. 7 shows on its internal periphery the "pole necks," around which the coils are placed. It will be seen that the field ring is of such a shape as to entirely enclose the field coils, thus thoroughly protecting them from mechanical injury. It will be noted also that the space in the field ring allowed for the field coils is unusually small. This arises from the fact that less than one-fourth as much energy is required to magnetize the fields of this dynamo as is necessary for a machine of equal capacity of ordinary design. On account of the very small amount of field energy required the rise in temperature of the field coils is very slight, notwithstanding the fact that these coils are so nearly surrounded on all sides. No compound winding is used on these dynamos, since the balancing coils afford a compounding vastly more effective than the compound coils of the ordinary dynamo.

All of the armatures for the Thompson-Ryan dynamos, of whatever capacity and whether wire wound or bar wound are constructed on the same general style. The cores are built of thin plates of a peculiar special steel, the distinctive feature of which is its unusually low hysteresis loss. The plates are stamped out in the form of rings, and a series of long slots are punched near the edges. These rings are then clamped firmly to a central hub or spider by means of brass end plates. There are no bolts passing through the laminated core, and no iron comes in contact with these plates. As a consequence of this there is no leakage of magnetism and no development of potential in any part of the core to cause eddy currents and waste energy. The holes in the plates form "tunnels, in which the armature wind-windings are placed. Fig 8 gives a very good idea of the appearance of the finished armature core.

Another peculiarity of this machine is the large number of poles used. This feature, which in or-

(*Continued on page 188.*)

The Inventive Age

Established 1889.

INVENTIVE AGE PUBLISHING CO.,

8th and H Sts., Washington, D. C.

ALEX. S. CAPEHART. MARSHALL H. JEWELL.

The INVENTIVE AGE is sent, postage prepaid, to any address in the United States, Canada or Mexico for $1 a year; to any other country, postage prepaid, $1.50.

Correspondence with inventors, mechanics, manufacturers, scientists and others is invited. The columns of this journal are open for the discussion of such subjects as are of general interest to its readers.

Technical matter is particularly desired. We want practical information from practical men.

Nothing will be published in the editorial columns for pay.

The INVENTIVE AGE is thoroughly independent.

Advertising rates made known on application. Special facilities for furnishing cuts of any patented article together with descriptive article. Business specials 25 cents a line each insertion, 7 words to the line. No advertisement less than 50 cents.

Address all communications to THE INVENTIVE AGE, Washington, D. C.

Entered at the Postoffice in Washington as second-class matter.

WASHINGTON, D. C., DECEMBER, 1895.

READERS of the INVENTIVE AGE will find in this issue some extraordinary premium offers. Zell's Cyclopedia, for instance, will be found incomparably superior to any premium offered with any other publication.

IN Germany the horse is giving way to electricity and in the application of this motive power to farm machinery our foreign neighbors have quite distanced American promotors. This fact is touched upon by our German consulate who says of the electrical plow that it ploughed eight acres to a depth of ten inches in eight hours at a cost of $1.29 an acre.

THE meeting of the National Association of manufacturers will be held in Chicago, January 31. This association should not be confused with the American Association of Inventors and Manufacturers which meets annually in Washington in January. In another column will be found a circular letter recently prepared and circulated by a committee of this association setting forth the objects of this organization.

THE illustrated article in this issue on improvements in engine and dynamo building will convey a good idea of the rapid advancement made in this class of engineering and at the same time will give our readers a description of one of the most complete electrical manufacturing plants in the country. The construction of the Thompson-Ryan generators presents a striking advance over existing types of dynamos, and embodies the important discoveries of Prof. Harris J. Ryan of Cornell university and Milton E. Thompson.

THE trade-mark department of the United States Patent Office, says Trade-Mark Record, is now being conducted more ably, more comfortably and more systematically than ever before in its history. And this is said without any intention of disparaging the able work of Col. Seely, the former examiner. But on the very lines laid down by him, there have been noteworthy improvements made, which tend to increase the efficiency of the office, and which are due to the conscientious and skilful efforts of the present trade-mark examiner, Mr. James T. Newton, who proves himself to be a most capable successor to his most able predecessor.

THE sentiment of the people of New York state having been found overwhelmingly in favor of spending $9,000,000 of the state's money for the improvement of the canals of that state the attention of congress is called to the fact that it is the overwhelming sentiment of the people of the whole country that greater encouragement and larger appropriations be made for internal improvements, irrigation in the great west, fortifications on coast lines and the completion of the Nicaragua canal. In no other manner can the circulation of money benefit the masses so much as on these lines and from no other policy can the government receive so much in return.

OF late an occasional complaint has been lodged by inventors against the methods and practices of certain model makers in various parts of the country. One subscriber charges that some of them are as bad as patent selling agents. The inventor seems to be the natural prey of unscrupulous schemers of all kinds. It is largely accounted for by the fact that the inventor—particularly one who has taken out his first patent—is usually over anxious to reap immediate rewards, and that anxiety dims his judgment. The INVENTIVE AGE has taken occasion to expose the flagrant frauds of patent agents and upon convincing testimony will extend its search light upon model makers or any other class who array themselves against the American inventor.

THE last annual report of the Commissioner of Patents shows that there were issued during the year 18,637 patents, New York leading with 3,329; Pennsylvania following with 1,904; Massachusetts, 1,676 and Illinois 1,632. The greatest percentage of patents to the number of inhabitants was in Connecticut one to every 993, and the lowest ratio of population to each patent granted was in South Carolina—only one to ever 15,581. The table showing the number of patents granted from the beginning of the patent office in 1836 down to the 31st of December last by classes, shows some remarkable facts. The class of carriages and wagons shows the largest number of patents, 20,096, followed by stoves and furnaces, 18,340. Plows, 10,192, harvesters 10,155, clasps, buckles and buttons, 11,725, and packing and storing vessels, 10,594, are the next in line. Electrical inventions are divided into several classes, otherwise this line would show up in the five figure columns. The business of the Patent Office is now well in hand but the necessity for an increase in the working force is urged by the Commissioner and recognized by all who are at all familiar with the Patent Office work. It is hoped that Congress will recognize the importance of the recommendations of the Commissioner in the interest of inventions and inventors.

THE report of the English Patent Office shows some curious facts. The report for the week ending November 30 showed the number of patents applied for 542, out of which about 78 were for improvements in and relating to vehicles of all sorts, most of them cycles; 53 related to machinery of various descriptions; 54 bore on domestic and household matters; 39 related to dress and personal adornment; 33 to building and decorating in all its branches; 31 to the manufacture of textile fabrics and other stuffs, and 19 to the machinery used in their production; 21 relate to steam and heat generators of all sorts; 15 to lamps, gas burners, and other forms of artificial lighting; 12 to electricity and its various applications; 11 to printing; 10 to medical, surgical, and hygienic matters; 9 to gas and acetylene; 7 to mining and metallurgy; 7 to chemistry; 6 to guns and ammunition; 4 to shipbuilding and the navy. A large number of the miscellaneous patents refer to bottles and to the means of preventing fraudulent refilling; there seems to be a boom in this line. There is also a safety devise for preventing the stealing of watches from pockets, and one improvement in life-saving appliances. For the week ending December 3 in the United States there were 364 applications for patents, and a total of 9,652 applications awaiting action. In this country as well as in England the tread of inventive genius is in the direction of "wheels," mechanically propelled and electrical, pneumatic, hydraulic and steam-engineering devices. The non-refilling bottle is just now receiving some attention in this country and enquiries are made by readers of the INVENTIVE AGE for the address of the party alleged to have offered a large sum for a successful invention in this line.

A Milwaukee music dealer is the inventor of leather covering for pianos. A sample instrument enclosed in ornamental leather is said to present a handsome appearance.

NOTES.

The First Bottles—The first bottles were composed of skins. They were usually made from goat skins, but almost any kind of hide was used in their manufacture. The carcase was pulled through the neck, keeping the skin as whole as possible. The inside was thoroughly cleansed, turned inside out, and then the outer surface of the skin was thickly covered with melted pitch. Tanned leather was also used for bottles requiring particularly rough usage. In many countries different varieties of gourds are still used.

* * *

Perfect Purification of Water.—We learn that sodium fluoride added to drinking water is much superior to alum for removing impurities such as calcium and magnesium salts, organic matter, noxious bacteria, and so forth. It is said that water thus treated with fluoride is, as a rule, absolutely pure, barring the presence of traces of alkaline carbonates, sulphates, and chlorides. Sodium fluoride it is claimed, is the only substance known which will really prevent the formation of scale in steam boilers. The amount to be added varies with the composition of the water, from 1 oz. each to 1,000 gallons upward.—*Invention.*

* * *

New Smoke Consuming Apparatus.—A smoke-consuming apparatus, the patent of Mr. W. McGlashan, of Leith, was tried successfully recently in Edinburgh. A tank of crude oil is placed above the furnace, and pipes are led from that down to the mouth of the ashpit, thence along the ashpit, passing through the bridge into a chamber. The end of a pipe is fitted with a brass plug, in which is a small needle-hole, through which the oil is forced by gravity. The ordinary door in the ashpit is opened a little to admit air to mix with the oil, which bursts into flame, thus consuming the smoke; hence, instead of the smoke passing along the flues, flame takes its place, which keeps the flues clean and augments the power of the boiler. There is a regulator for controlling the supply of the oil, which acts when the fire is bright and oil is not required.

* * *

Richest Man in the World.—As a result of the unprecedented boom in South African gold mine stocks in the London market the "Dark Continent" now possesses, it is believed, the richest man in the world. His name is Barney Barnato. Another interesting fact about him is that he has one of the handsomest wives in the world and two beautiful children with whom he enjoys all of the time that he can spare from his business affairs. When one stops to consider the fact that but a few years ago he was an inhabitant of the slums of London and that he reached Johannesburg as a circus clown with only $4 in his possession, the conviction that "Barney" has enjoyed more than his share of good luck becomes irresistible.

* * *

Navigating the Air with Kites.—Lieutenant B. Baden-Powell described a means he suggested for navigating the air by means of kites. He pointed out that as greater height above the surface of the earth is reached, the wind nearly always increases in force. At 1,000 yds. it often blows at three times the velocity that it does near the surface. He proposes to take advantage of this difference by sending one kite to the upper atmosphere, and keeping another nearer the ground. The two kites would be connected by a long line, and the weight to be carried would be attached to the line at a point nearer to the lower kite than to the higher. The lower kite would thus supply a retarding medium to the upper, so that the effect would be the same in principle, though not in degree, as if the upper kite were held to the earth by a string, and the lower kite were towed through the air by a boy running with the string in his hand.

Great regret is felt in Sweden at the death of Professor Sven L. Loven, the famous zoologist, which occurred in Stockholm recently. The professor was eighty-six years old and worked to the very last. He wrote a number of books on zoological subjects. He was an officer of the Prussian order "Pour le Merite."

In London every public building, from the Queen's Palace down, is supplied with a fire annihilator. Some of the large ones will produce 17,000 gallons of carbonic gas and steam in the space of four or five minutes.

It is said that a bat finds its way without the assistance of its eyes. A blinded bat will avoid wires and obstructions as dexterously as though it could see perfectly.

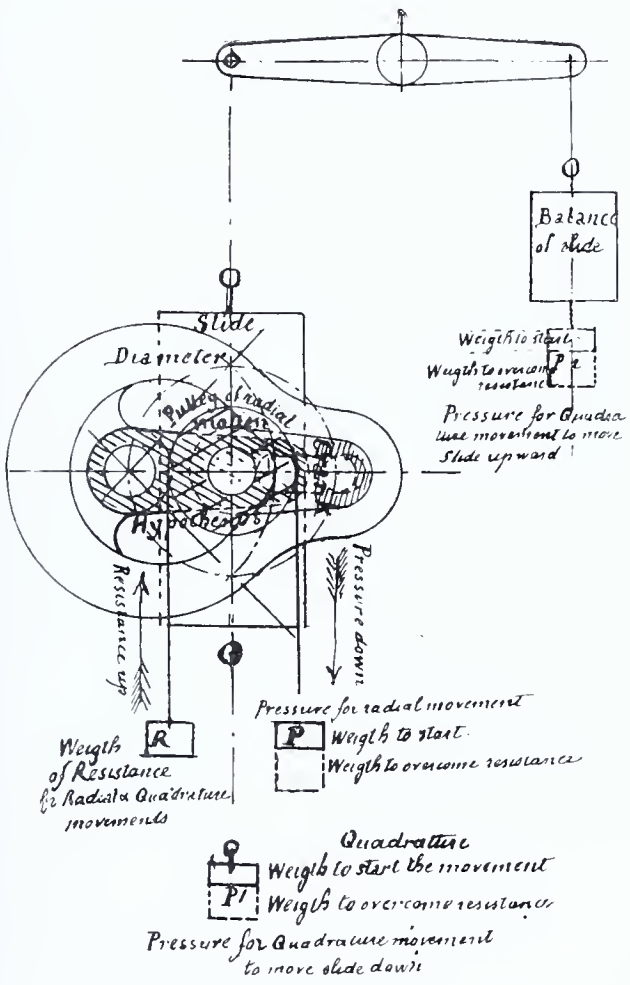
A lobster's skin when shedding splits down the back and comes off in two equal parts. The tail slips out of the shell like a finger out of a glove.

Quadrature Conversion of Power.

Though I am unable to make any radical appliance with the Quadrature conversion published in the AGE, June 1894, you will oblige me by publishing further the results of some practical tests made lately.

No one seems to admit the correctness of the value of the stroke for ½ revolution of the quadrature movement to be 50 per cent more powerful than in present systems, on account of the developed speed of the crank (see INVENTION AGE of June 1894)—objecting that to overcome a given resistance it takes the same amount of feed and pressure, regardless of speed and time, for all known systems which yield from 95 to 99 per cent of the applied power. The introduction of a new system could bring no improvement, as no system producing power could be made. In consequence I undertook to compare with weights the reciprocal values of radial motion and Quadrature conversion.

On the crank shaft of the model I set a pulley whose development on the circle is equal to the length of two strokes made by the slide of same model. Representing a radial movement with same length of feed for one revolution as the model of quadrature possesses it will act on the same principle as a water wheel, or as some of the engines whose slides are carrying racks driving a pinion instead of a crank making one half revolution for each stroke. Over said pulley a cord is attached, both ends holding weights, the weight P acting as pressure to lift the weight R being the resistance, (see sketch), the weight of the slide and parts of the device being balanced so that the same pressure on either side of the cord will set it in motion up or down.



To overcome the friction of the slide and parts of the model, no resistance being applied, the crank making 90 degrees or ¼ revolution, a weight equal to 5½ units was attached on the end P of the cord.

To lift 1 unit set as resistance on R 6⅝ units on P were required, the crank making 90 degrees. To lift 3 units set as resistance on R 8⅞ units on P were required, the crank making 90 degrees. To lift 5 units set as resistance on R 11⅛ units on P were required, the crank making 90 degrees. To lift 7 units set as resistance on R 13⅜ units on P were required, the crank making 90 degrees.

Each unit of resistance requires ⅛ of a unit added of the pressure to overcome frictions and comply with the law of gravitation.

By taking off the weight on P from the pulley using only the side of resistance I applied the pressure on P1 moving the slide direct, the device acting on the principle of quadarture conversion. The following results were obtained:

For one stroke the crank performing ½ revolution or 180 degrees, without any weight of resistance it required a weight of 4½ units while above 5½ were needed—22 per cent gain for less pressure.

To lift 1 unit resistance on R 5½ units were set on P1 instead 6⅝ previous—20 per cent gain on Quadrature. To lift 3 units resistance on R 7½ units were set on P1 instead 8⅞ previous—18 per cent gain on Quadrature. To lift 5 units resistance on R 9½ units were set on P1 instead 11⅛ previous—16 per cent gain on Quadrature. To lift 7 units resistance on R 11½ units were set on P1 instead 13⅜ previous—15 per cent gain on Quadrature.

Though the crank made 180 degrees instead of 90 on the rotary movement in considerable less time or faster speed, the pressure applied is over 12 per cent less than before. It demonstrates that by applying the power to the hypothenuse a resistance equal to the pressure will be forwarded a distance equal to the length of the stroke.

The same is true for the upward stroke and for all the different speeds it may be subjected to. This movement will be made compound with cranks set at 90 degrees to prevent the momentum of the extreme ends. The developed speed of the crank allows this conversion to perform its revolution on the principle of the law of gravitation. The machine will be provided with speed regulators and safety valves as used in actual systems. As stated before, the hypothenuse has entire control over the crank and the pressure being cut off the machine will stop securely and instantly without the use of brakes.

The motive power, air, whose propriety (compression and expansion) are known; the motor air cylinder nearly the same as for steam; the generator, air pump—all existing—there will be no time wasted to invent them; and their combination to suit the device of quadrature conversion will require but a few months of study and labor to bring this invention into practical use.

PETER FELIX MENY.

Elizabeth, Nov. 30, 1895.

Paying Inventions.

The great successes are made in simple inventions. "Pigs in clover," and the rubber mats for change are commonly cited as examples of the money in patenting little things. There are plenty of others, however, equally simple and equally fruitful in returns. The idea of a cardboard reinforcement at the hole of a shipping tag made paper available for that purpose and made the fortune of Mr. Dennison, now president of the Dennison Tag Co. Copper toes for shoes made a backwoods Maine farmer named George A. Mitchell, a millionaire, and Mr. Henton, of Providence, R. I., lined his pockets with the proceeds of his idea of metal button fasteners for shoes. The tin cap on bottles and the patent tin can openers have been good things. The brass spring fingers that hold a lamp chimney mean an income for the inventor equal to what we pay Grover Cleveland. W. A. Thrall used to have a good position as General Passenger agent of the Chicago & North-Western. Since his invention of the 1000-mile ticket now generally in use, he don't need any position at all, as he pulls in some $20,000 a year royalty. The best part of it all is that opportunities for inventive genius are by no means exhausted as yet. There is a chance for every last reader of The American Artisan to become a millionaire easily, provided he hits on some simple contrivance that can perform some little function better and cheaper than it can otherwise be done. You needn't keep your head "*in nubibus*," as the old Latins said. The man who can cheaply get energy directly from coal will be a millionaire, but so will be the man who thimblerigs some 2-cent device for preventing bottles from being refilled. There is of course more glory in being the genius to solve a great question of mechanical energy, but the bottle-stopper man can spend his remaining days in globe-trotting without one financial care on his mind.—*American Artisan.*

The "Soo" Canal.

The following facts regarding the Sault Ste. Marie canal, will be found interesting: The width of the river opposite the city is three-fourths of a mile; depth of river in channel, 34 feet; discharge of water, 90,783 cubic feet per second, equal to 720,000 horse power; length of ship canal, 1⅓ miles; width of lock, 80 feet; length of lock, 515 feet; depth of water over mitre sill, 14 feet; new lock is 800 feet long, 100 feet wide and 21 feet deep, the largest in the world; the average number of boats passing through the lock daily, 1894–5, 100; one-sixth of the commerce of the United States passes through the Soo ship canal; length of International railroad bridge, 1 mile; bridge over rapids, ½ mile; estimated improvements for 1895 and 1896, U. S. ship canal about $1,100,000; U. S. dry docks, $1,000,000; Hay Lake channel, $250,000; water power canal, $1,000,000. State locks started June 4, 1853. Finished April 19, 1855. Cost, $999,802.46. First boat through June 18, 1855. Work on present lock commenced Oct., 1870. First stone laid July 25, 1876. Finished Sept. 1, 1881. Total cost of canal improvements and lock, $2,150,000.

Hiram Maxim still believes in his flying machine, and devotes much time and thought to it.

Money in Simple Inventions.

Fully 90 per cent of inventions fail to make money for those who have spent years of thought, and, perhaps, their whole capital upon them, said a well-known north of England patent agent to a contributor to Tit-Bits. And you little know the amount of misery there is often wrapped up in a little bright idea, or a thing that "is bound to make a fortune."

There is always plenty of capital in the market for really good things out of which money is likely to be made, but inventors often fail because of several reasons. An invention may be very clever and much admired, but unless the price is improved along with the method, capitalists will have nothing to do with the article. It is always well for young inventors to be secretive, and to abstain from disclosing their idea except to those they can thoroughly trust. I know men who are now enjoying fortunes out of inventions and ideas they have stolen from the inventors.

I was speaking of why inventions fail. Well inventions that are very intricate are doomed to failure however smoothly they may work, or however cleverly they may be designed. Money is chiefly made out of inventions that are extremely simple, can be made without any extraordinary outlay of capital, and appeal to the popular fancy and the nimble coppers. When your article costs the public more than 2s. 6d., it must have a very great commercial value and be almost indispensable, or the public won't give it a second thought.

There is a fortune just now awaiting the man who can produce a perfect anti-nicotine pipe which can be retailed at a low price. There is also wanted a cheap apparatus for enabling householders to collect and consume the carbon which now escapes in black clouds in the air. Invent something in the latter form and every health authority in the kingdom will compel householders to adopt it. Then there is the penny article, out of which so many large fortunes may be made. A collar-stud which would not slip through the linen would bring in a nice fortune to the man who introduced and patented the article. I have seen many new studs but so far as my knowledge extends, the perfect article has not yet been produced. Penny mechanical toys pay well because they are so readily bought up; but produce something really serviceable which can be sold for a few coppers, and you will have a settled income for life.

The majority of inventions fail because they are too intricate or cost too much to produce. Simplicity is everything in a good paying invention.

A Woman's Genius.

Among the inventions of women on exhibition at Atlanta is one interesting for two reasons—the first that it dates from a period before women were accounted active in any but the domestic world and the second, that it deals with a department of industry into which women always venture at a risk of being suspected of scant knowledge and less experience—mechanics. This is the straw-sewing machine, which is entered by the Committee on Inventions by permission of its inventor, Mrs. Mary P. Carpenter Hooper of this city. Although its patent has now expired, and its usefulness in part done away with, this little machine, not so big as a typewriter, worked a revolution in a great industry, and today there is not an inch of straw braid sewn into hats by machinery anywhere in the world that does not employ a part of Mrs. Hooper's invention to accomplish the work. Before the invention of this machine the making of straw hats was an expensive and bungling operation. With this machine the hat was made from its tip or top to the outer edge of the brim without taking it from the machine, and when finished it was right side out and the stitch concealed.

Interesting to Ladies.

One of the most ingenious dish-washing machines we have ever seen was exhibited at the offices of the INVENTIVE AGE a few days ago, by Mr. R. G. DuBois, the well known patent attorney. It has a rotary dasher which works upon the principle of the Archemedes screw, and when set in motion, lifts the water up from the bottom of a reservoir and projects it laterally in strong streams against the sides of dishes placed in a surrounding rack, thus using the water over and over again in cycloidal fashion at the rate of thirty gallons per minute. Mr. W. H. Cox of Virden, Ill., is the inventor and he has doubtless struck a valuable and practical dish-washing machine at last, which should be appreciated all the more when we look at the hundreds of impractical and worthless devices patented for such purposes.

The thinnest sheet of iron ever rolled has a surface of fifty-five square inches and weighs but twenty grains. It would take one thousand and eight hundred such sheets to make a layer an inch thick.

Improvements in Engine and Dynamo Building.

(*Continued from first page.*)

dinary designs would be bad practice, is a valuable one of this peculiar style of design, enabling the builders to greatly shorten their armature conductors, and to use on all their armatures what may be described as the cylindro-hexagonal style of drum winding. In this winding, all parts of every conductor of any particular layer on the armature lie in the same cylindrical surface, and the windings do not bend down over the end of the armature core at any point, and the conductors being placed through the core and below the surface, no binding wire is necessary.

They are carefully and solidly built and, as a rule, are large in diameter and comparatively short in length. They are not mounted on the shaft as is the usual practice, but are carried by a projecting ring of the spider. Fig. 9 is a view of the completed armature for a 200 K. W. direct connected railway generator.

One of the most important features of these armatures is in the ventilation. The armature being large in diameter the central opening is also large and extends entirely through the armature from end to end, thus affording large heat radiating surface. The principal ventilation is effected by the winding itself. The conductors cross one another in such a way as to form a sort of open lattice work with innumerable radial openings through which the air circulates in great quantities.

Fig. 10 is a view of complete brush holder arrangement. The brush holders project outward, and leave the entire outer end of the commutator free and accessible.

The brush holders themselves are very simple, and hold the brushes in such a way that they require no adjustment, but have only to be slipped into the holder. Working with brush holders absolutely fixed, there is entire freedom from sparking under any and all conditions of load.

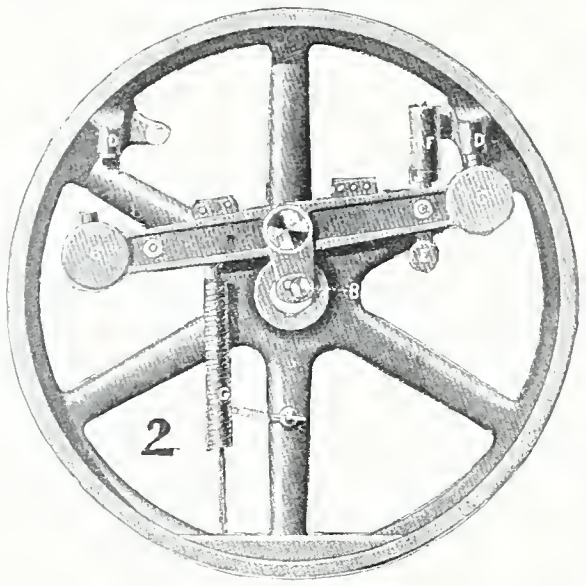
The whole brush holder arrangement is adjustable around the commutator, and by loosening the clamp bolts, the brushes may be shifted backward or forward. This is only done, however, for the purpose of adjusting the compounding of the machine. By shifting the brushes in this way the machines may be adjusted through a range of from 10 per cent drop at full load to 10 per cent rise, and this without any effect whatever on the commutation.

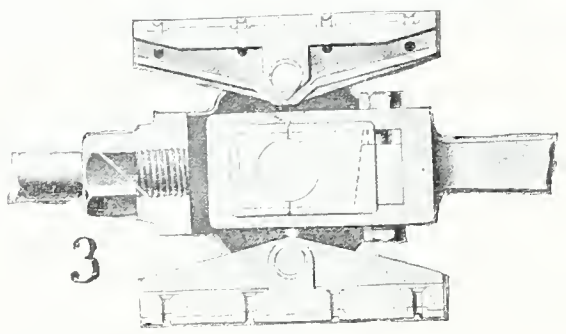
Figure 11 shows a curve of commercial efficiency taken from actual tests of a Thompson-Ryan 200 K. W. railway generator.

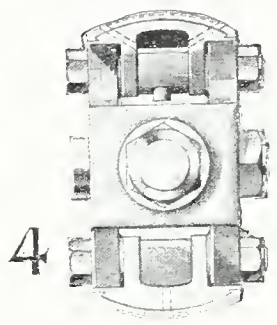
Another important feature of this dynamo is the great ease with which two or more machines may be worked in parallel. The design of the machine peculiarly fits it for this sort of service. They may be thrown in parallel while differing widely in voltage produced, and each machine will take its due proportion of the load, notwithstanding the fact that they may be greatly over compounded. Two or more of these machines will work perfectly in parallel, and divide the lightest load evenly or maintain perfect unison with the entire load thrown off.

The Thompson-Ryan dynamos are built in sizes from 12½ K. W. to 1500 K. W., capacity both belted and direct connected. Fig. 1 shows the belted dynamo as well as the dynamo, direct connected to the different types of the McEwen engines.

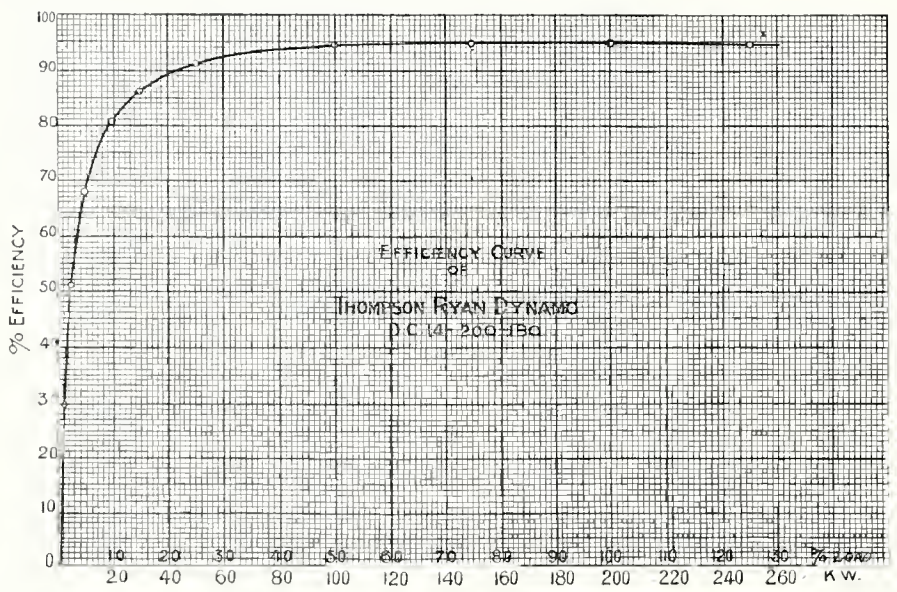
The manufacturers state they will be pleased to furnish handsomely illustrated catalogues of either engine or dynamo to those who request them.

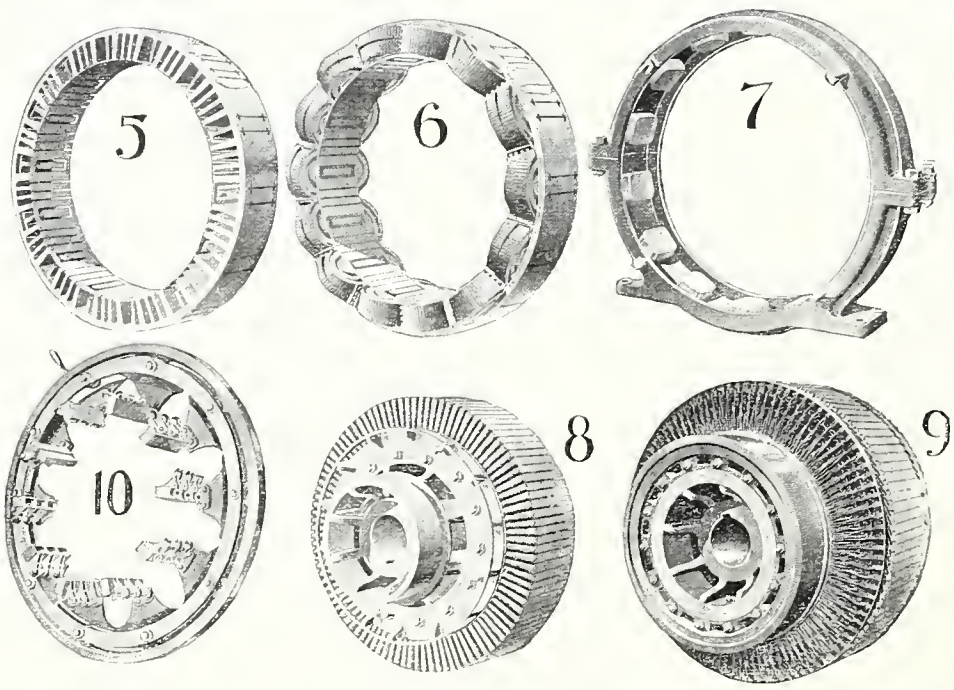






South Pub Co N.Y.





Intense cold, as is well-known, burns—if we may use the term—like heat. If a " drop " of air at a temperature of 180° below zero were placed upon the hand it would have the same effect as would that quantity of molten steel. Everyone who has had the care of horses ought to know the intense pain caused by placing a frosted bit into a horse's mouth. It burns like hot iron.

Inventors and Stock Jobbers.

When it is flamingly proclaimed in advance of actual performance and with a good deal of surrounding mystery that something has been invented that in any industrial line of work is to revolutionize all current practice, it is wise for those who are interested in the matter to look for something behind the inventor's enthusiasm—to look for stock-jobbing operation, or something of the sort. The daily press is little apt to exploit, pictorially at that, the efforts of a poor inventor, and inventors in the majority of instances are poor men; there isn't any money in it, and there isn't any sensation about it. Those who write up such matters for the daily newspaper seldom know anything in particular of the subject if it is something mechanical; their main gift is in the free use of adjectives and the enveloping the whole thing in a shrouding of mystery. Elswhere in the paper it is in order to look for a liberal-sized advertisement, stating that books are opened at some broker's office for the sale of a "limited number of shares only." Now is the time to button up the pocket in which you carry your money.—*F. F. Hemingway, in The Tradesman.*

Storage Battery Lighting Plant for a Residence.

The Electric Storage Battery Company, of Philadelphia, has recently closed a contract for a complete electric lighting plant for Mr. Frank Thompson, Merion, Pennsylvania, vice-president of the Pennsylvania Railroad Company. The plant consists of an Otto gasoline engine, capable of giving 26 actual horse-power. The engine is belted to a four-pole shuntwound dynamo having a capacity of 20 kilowatts.

The storage battery consists of 60 chloride accumulator elements in lead-lined tanks. These cells have a capacity of 1,000-ampere hours at a 10-hour discharge rate, but provision is made in the lead-lined tanks to double the number of plates, thereby increasing the capacity to 2,000-ampere hours. The power house and storage battery room is situated about 300 yards away from the residence, the current being conveyed by a 300,000 circular mil cable run partly on poles and partly underground. The power house has been specially designed and built for a private house lighting plant, and the whole installation will be as complete as it is possible to make it.

The Cotton Industry in Japan.

The first spinning factory in Japan was established in Kagashima more than forty years ago by Shemazu Harihisa, the greatest feudel prince of modern times. He saw, with the eye of a statesman, the commercial advantage, geographicaly, his country had to win wealth as a manufacturing emporium for Asia. The second cotton mill was built in Japan in the year 1867 at Agi. In 1870 two others were established by the Japanese government, four in 1880 four in 1881 one in 1882 one in 1883 and one in 1884 and together with others since established now operate 580,564 spindles. The factories now in operation together with those now in process of construction will when completed, operate 819,115 spindles.

As a result of the Japanese-Chinese war the fourth article of the treaty of peace concluded between these countries is as follows:

"Japanese subjects shall be free to engage in all kinds of manufacturing industries in all the open cities, towns, and ports of China, and shall be at liberty to import into China all kinds of machinery, paying only the stipulated import duties thereon."

This provision will give Japan a very greatly enlarged field for operation in the cotton industry. As is well known the Japanese are the greatest imitators in the world: that they have no patent laws by which foreigners may be protected and that they copy the patented articles of the world, as well as trade marks, with the freedom of pirates, and will continue to do so until 1899 when the new treaty takes effect. Their cheap labor (about 17 cents a day in gold for men and 11 cents for women) will soon make them the most dangerous rivals we have in the commercial world. As a result of the Japanese-Chinese war and the treaty made at its conclusion Japanese industry and ingenuity is destined to over run China, and along the Yangtse valley the soil available for cotton raising appears as limitless as the supply of cheap Chinese labor is inexhaustable. Last year aftersupplying the local demand it has been estimated that enough cotton was exported to have run 360,000 spindles for the year. The manner of cultivating and caring for cotton in China is yet very crude and greatly lacking in producing the best results attainable but with the thrift and enterprise of the Japanese willcome improved methods in cultivation which will not only greatly increase the quantity but will also greatly improve the quality of Chinese cotton.

As a result we may soon expect to see perfect imitations of all cotton goods manufactured in America --regardless of trade marks and brands used to protect the American manufacturer--on sale in the foreign markets of the world, made in China and Japan and at prices lower than they can be produced for in our own country. One of the subjects for the statesmen in the near future will be how best can we protect the American manufacturer and laborer from the imitative genius, piracy, and cheap labor of Japan, not alone in cotton and cotton goods but in the manufacture of everything the arts produce.

The Duryea Horseless Carriage.

The leader in the recent horseless carriage race in Chicago was the Duryea, the result of three years' inventive effort on the part of Charles E. Duryea, of Peoria, Ill. It weighs 700 pounds and can attain a speed of twenty miles an hour. On good roads it has already reached even a higher rate of speed. Its motor is a four-horse power engine and weighs 120 pounds. The diameter of the front wheels is 34 inches of the rear wheels, 38 inches. Only five minutes is required in replenishing its fuel supply. The arrangement of the gearing is such that the carriage can be made to run from three to sixteen miles an hour, and the gradation from the minimum to the maximum degree of rotation is accomplished without the motor changing its rate of speed, the pressing of the button effecting this object.

The axletrees of the carriage are fixed to the body, dividing at the ends into vertical forks, into which are fitted pieces like ordinary carriage hubs in shape,which hold the axle. Bolts run through these pieces, and a connecting rod of iron, extending back of the axletree and joined at the center of the wagon with the steering device, makes the separately swung wheels work together. The lateral movement of the lever turns the wheels, and the vertical movement starts or stops, changes the rate of speed and reverses its movements, driving it backward when desired. Ball-joints and ball-bearings minimize all effort and friction and minimize the power used. The brake drum is under the seat and is controlled by a wire with a button at the front corner of the seat by which, under a speed of twelve miles an hour, the vehicle can be stopped in a few feet.

By the proper arrangement of gears, cones and levers a change of speed is instantly effected by the vertical movement of the lever. In this machine the sterring heads are placed as close as possible to the wheels, and at the same time are so angled their line strikes the plane of the wheel at just the point a stone or obstruction would naturally been countered. This does away with the leverage, which tends to turn the wheel by breaking the force along the line of the head.

Among the advantages claimed for the Duryea machine are little noise or odor, excellent springs, four speeds—five, ten and twenty miles an hour forward, and three miles backward; can be quickly geared to different speeds; can be run at any speed desired below its limit; its fuel costs less than one-half cent per mile, it carries eight gallons of fuel; runs from 100 to 200 miles without refilling, has self-oiling motors and bearings; will not jerk the levers out of the driver's hands, and is not dangerous either from fire or explosion.

THE JAPANESE LEGATION, PEKIN.

BOOKS AND MAGAZINES.

Beginning with January, 1896, issue, the price of The Irrigation Age will be reduced from $2.00 to $1.00 a year. This magazine is the recognized authority on all matters concerning Western interests. Although but just entering upon its sixth year, it has attracted universal attention, being more widely read and receiving more flattering notices, and being more frequently quoted than many journals of ten or twenty years' standing.

* * *

Two very important facts in connection with the new era of magazines are illustrated in the December Cosmopolitan. Its fiction is by Stevenson, the last story written before his death, "Ouida," Sarah Grand, Zangwill, and the beginning of James Lane Allen's new Kentucky realistic story, "Butterflies." Probably no stronger array of fiction has ever been presented in any magazine—money could not buy better. Nor has any magazine ever had a larger number of really distinguished artists engaged upon the illustration of a single number.

* * *

The January issue of The Photographic Times will be a special holiday number, containing a list of attractions including over one hundred illustrations. It will be published on the 15th of December, and begins a new volume. With this issue an Encyclopædic Dictionary of Photography will be commenced. It will be so printed that when complete it can be separately bound, and will form the completest work upon the science and art of photography that has ever been published, containing over two thousand references and five hundred illustrations.

* * *

The American Annual of Photography and Photographic Times Almanac for 1896, edited by Walter E. Woodbury and published by Scovill & Adams Co., of New York, far excels any of the previous nine issues of this work. It contains many valuable articles by competent authors and over two hundred illustrations of the photographic art, some of which are reproductions of the finest work produced by the best photographers of this and other countries. An up to date work for artist photographers. Price in paper cover, 75 cents; in cloth binding, $1.25.

* * *

The publishers of Electric Power, New York, have in press a little volume that promises to be of great interest to all persons interested in electrical matters. It is a synopsis of current electrical literature, compiled from the leading technical magazines of the country. This matter has been selected and compiled by Mr. Osterberg, the well known electrical engineer. Copies can be obtained through the Inventive Age at publisher's price.

* * *

The Mining Industry and Review, of Denver, Colorado, has steadily developed, under the supervision of Mr. W. C. Wynkoop, into one of the leading mining journals of the country.

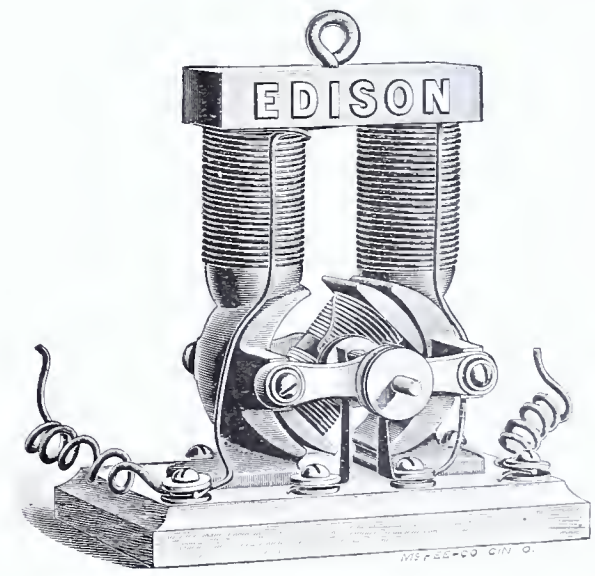
* * *

The subject of this month's character sketch in the *Review of Reviews* is Mr. Herbert Spencer. The sketch was written by an intimate friend whose identity is not disclosed. It is the most complete record of the great philosopher's life and achievements that has yet appeared. The writer tells us that "Social Statics" could not find a publisher in 1850, so that Mr. Spencer was obliged to print it at his own cost and sell it on commission. It took fourteen years to dispose of the edition of 750 copies. "Principles of Psychology" had a like experience, while Mr. Spencer was kept out of pocket for the capital sunk in these two ventures. It was the same with his other philosophical works a first, and in the course of 15 years Mr. Spencer lost more than £1,200. It was not till 24 years after he began to publish that he was fully abreast of his losses.

THE $1 EDISON MOTOR.

The cut shown herewith represents one of the most satisfactory and perfect of all small dynamos, capable of running toys, fans, light models, and for innumerable uses. To the youth, scientifically inclined, it offers great satisfaction and benefit.

Never has such workmanship and material been put into a small machine. The field pieces are of a special quality of extra soft iron. The iron of the armatures is of still another quality, and specially treated to render it suited to our purpose. The



shafting is of the finest polished cold rolled steel, not varying a thousanth part of an inch in diameter. The bearings are of hard red brass indentically the same as that used on large machines and the motor will run at the remarkable high speed of 2,000 revolutions per minute. it is a marvel in price and if not made in large quantities would cost from $5 to $10. We can furnish the motor for $1 and will send one free to any person forwarding us three new subscribers.

PATENT OFFICE AND COURT DECISIONS.

On the Question of Priority of Invention in Interference—An Injustice to Inventors.

The trend of the judicial mind of some of the commissioners of patents and judges of courts, seems to have been in the direction of rewarding senior applicants for patents who are junior inventors, in preference to junior applicants who are senior inventors, and it is to be feared that this will prove dangerous to the rights of real and meritorious inventors, for the junior inventor might, through his own cupidity or avarice, or by the aid of capitalists, outrun the senior inventor of limited means, resources, and honest pursuit, by catching up the first inventor's ideas and first applying for a patent, and thereby working great injury to him.

It is to be deeply regretted that recently decisions have been rendered which deprived inventors who were the first to conceive, and to all intents and purposes had reduced their inventions to practice by giving the benefit of their genius and brain work—the highest type of all work, to parties who rushed to the Patent Office ahead of them, say a few days, weeks or months, and who had not previously made even perfect models of their paper represented idea and in some instances no models at all being made, while the real inventors had experimented, reduced to practice, and tested their inventions long prior to the first conceptions by the junior inventors. This tendency it is hoped will be checked.

It certainly is not according to law to decide that the first one to conceive an invention of a finger ring, and who makes that ring of only a diameter to fit a child's finger instead of a man's finger, has not reduced his invention to practice—that his child's sized finger ring was only a "model," and the invention not completed and reduced to practice because it was not a full sized, man's ring ; and that a junior inventor who conceived the same ring and simply made a Patent Office drawing of it and filed the same with a specification in the Patent Office, is the first inventor, and entitled to the patent over the one who first conceived the ring, and within two years after he had learned of his opponents claim, or before his opponent's patent was granted, filed his application for a patent. Such decisions, we respectfully say, seem to be a travesty on justice, and it is to be hoped they will cease in the Patent Office and in the courts.

For instance, is it not plain that, when a single structure or thing is made five or six inches in length, and in the exact form, size and proportion, in cross section, that it is to be made afterwards commercially, except that its commercial length is ten or twenty feet, will remain the same invention when it is made ten or twenty feet long. Again, if an inventor makes a structure which contains his invention, so far as form and result are concerned, out of two pieces, and bolts the pieces together, and afterwards commercially makes the structure in one piece, no change whatever having been made in the invention, and the results secured thereby being the same, would it be justice to give the junior inventor, who has never made a commercial structure at all, or such structure in one piece, priority of invention, simply because he rushed to the Patent Office with a drawing and specification of the invention of the senior inventor and filed ahead of him. It does not seem to me that this would be right, and in accord with our patent laws, as the senior inventor would be deprived of his inchoate right belonging to him by reason of his first conception and reduction of the invention to practice.

In many of the decisions in this direction, the error lies in not making a distinction between cases where complicated combinations of mechanism, instead of simple devices or articles of manufacture, are involved—such complicated mechanisms rendering the matter of reduction to practice a doubtful one until a miniature machine, or a full size practically operating machine, has been actually put into operation. It is evident that simple devices consisting of a single piece, or a few pieces about which there cannot be any question as to the practical working of the invention, should not be treated in the same manner and by the same rule of judgment as complicated machinery is treated.

It is a great mistake to conclude that Judge Taft in the case of Christie vs. Siebold, awarded priority of invention to Christie simply because he first constructively reduced his invention to practice by filing his application in the Patent Office ahead of Siebold. Priority in that case was given to Christie who filed last, simply because Siebold had not actually made a model or a working press, prior to Siebold. This appears to me to be the fact of the case as I read the decision.

In a case decided in the Circuit Court, District of New Jersey, February 9, 1894, Fed. Rep., Vol. 60, page 603, it appears that one Juengst filed his application in the Patent Office, September 24, 1890, after two other patentees had obtained patents on applications filed, respectively, October 11, 1888 and July 9, 1889, and notwithstanding both of these parties were prior in their dates of filing, priority was awarded to Juengst by the United States Patent Office, and this action was sustained by the courts. It appears from the testimony that Juengst, the patentee, made simply a crude machine, of which the court said :

"It is true that the machine was never brought into such a perfectly finished state as to be fit for employment as a cash register for ordinary business purposes and its registering and indicating devices were defective, and seem always to have been so. But the test of perfected invention here, is not whether the various distinct mechanisms entering into the Juengst machine, all worked with practical success. In themselves cash registers were old, and were in common use. The inventions in question were only improvements in such machines, additions thereto, designed to give them efficiency. The mechanism in which Juengst embodied his inventions was amply sufficient to demonstrate the practical success thereof. This it actually did to the satisfaction of those to whom it was exhibited. To apply to the old machine the improvements which Juengst thus devised, put in operative form, and disclosed, *required only common mechanical skill.* Upon the proofs and under the authorities I am entirely satisfied that what Juengst did in 1886 was a reduction to practice of the inventions in controversy, and that his machine then built and operated, since preserved in its original shape and now produced in evidence, contains the inventions in a completed and practical form. (Curt. Pat., Sec. 87, a ; Reed vs. Cutter, 1 Story, 590 ; Fed. Cas., No. 11, 645 ; Coffin vs. Ogden, 18 Wall., 120 ; Pickerings vs. McCullough, 504 U. S., 310, 319.) I am therefore of the opinion that letters patent for the same were rightly granted to Chas. A. Juengst, assignor to the defendant company."

After a life long practice in the profession as patent attorney and counsel or, singly, and in association with Judges Chas. Mason and DeWitt Lawrence, I feel much regret at seeing the sound and accepted decisions in patent cases, of those grand Jurists, Story, Marshall, Washington, Taney, Blatchford, and others whose names are written high on the scroll of fame, brushed away as cobwebs ; and also a want of due respect being shown to the rights of the most meritorious and noblest beings who walk our earth—the inventors, and the same given to those who have no merit except that of rapid running away with the products of other men's brains, and depositing the same in the Patent Office and setting up claims for patents thereon.

ROBERT W. FENWICK.

Washington, D. C., Dec. 6, 1895.

Wreck Proof Mail Car.

One of the latest and most commendable improvements made by Uncle Sam is a robber and wreck proof mail car, which has just been put into service upon some of the eastern roads. Heretofore when there has been a wreck, the mail car being the frailest car on the train, was most frequently the one smashed to splinters, and the unfortunate mail clerks had one chance in a hundred of escaping even in a badly battered condition. The death roll of railway mail clerks for the past twenty years mounts up into the hundreds, and scores of men have been crippled for life in wrecks because the mail car couldn't withstand the shock of collision as well as the passenger coaches. The new car is designed to withstand almost any shock. They have no platforms at the ends, and the framework of the car is of tough yellow pine, lined with sheets of steel. The end parts of the cars are framed with angles of iron, and the whole structure is a model of strength, impervious to the bullets of a train robber, and constructed to resist to the last degree the rending force of a collision. If it proves successful, the government will at least have recognized the dangerous position of its mail clerks, who have heretofore carried their lives in their hands almost while at work on the road.

"Probably it has never occurred to you to consider how many arts and industries that are of any importance today were unknown in 1880," says Chief Examiner Greely of the Patent Office. "Their creation has given employment to tens of thousands of people and to billions of dollars of capital. If we were thrown back only so far as a decade and a half, we should find ourselves deprived of numerous comforts, and even necessaries, as we now regard them, which were not obtainable at all fifteen years ago."

The best telephone facilities possessed by any city in the world are enjoyed by Mariehamn, the capital of the Aland Island, in the middle of the Baltic Sea, in which there is an exchange telephone for every 13 inhabitants.

The Age of American Civilization.

We are accustomed to speak of everything in America as brand-new, says the Portland Oregonian. It smells to us of varnish more than of anything else, and when we go abroad we say of buildings and of institutions, "Alas, we have nothing at all of this sort in America !" There is truth in this and yet perhaps we do not sufficiently realize how long our American civilization has been growing, and how much of the world's history has been made in the last 250 years. It is interesting to find a suggestion of this nature emanating from so thoroughly English a source as the London *Spectator*, the attention of which has been drawn to the age of our Americrn colleges by a book of illustrations of our university buildings.

Let us follow out this suggestion, and, taking Harvard university as a measure of age, see where the world was standing at the time of the foundation of that institution. This was in 1638, Charles I was on the throne of England. Cromwell was a young man, "guiltless of his country's blood," and had just been turned back from his plan of coming to America. The face of Germany was then desolated with the Thirty Years' war. Richelieu had just formed the French academy and was in the zenith of his power.

The Spanish inquisition was pursuing its relentless work, and Galileo was yet busy with his literary labors. It was 60 years before Peter the Great applied in London for his naval apprenticeship, and nearly 100 years before Frederick the Great came into his inheritance. We are apt to think of English literature as antedating our American civilization ; yet at the time the New World had taken on the educational and moral strength which gave us Harvard college, English literature was practically unwritten, if we except Chaucer, Spenser, and Shakespeare. "Paradise Lost" was only a dream of Milton, who was 30 years old in 1638, and then began his continental journeys. Dryden was six years old ; Bunyan was ten, with no thought of serving under Cromwell or being jailed for his views. Pope, Swift, Addison, Bolingbroke, Bishop Berkeley, were yet unborn.

These reflections show us how large a part of human history belongs to the period since the foundation of our oldest university.

Irrigation and Vegetarianism.

Arguing against the policy of the government in fostering and encouraging systems of irrigation in the sub-arid regions of the west, a Phœnix correspondent of the *New York Tribune*, says: If the lessons of history prove anything, they clearly demonstrate that all races who have depended upon irrigation for subsistence have perished from the earth. The Egyptians have been slaves to some carnivorous conquerors since the dawn of history, and now cultivate the valley of the Nile for the beef-eating English. The dense population once cultivating the valley of the Euphrates by irrigation have perished from the earth, and nothing remains but a gloomy history and the mounds of mud which mark the ruins of Babylon.

The Chinese cultivated the soil by irrigation, and 50,000 meat-eating Tartars conquered the empire of 400,000,000 of irrigators, and their descendants hold China as a conquered country to this day. The Carthaginians subsisted by extracting a support from the deserts of Northern Africa by means of irrigation, and the ruins of Carthage attest the ephemeral effects of irrigated subsistence on the decay of races. The Jews cultivated the little valley of the Jordan by irrigation, and they are dispersed over the face of the earth.

In Italy the statistics of 2,000 years (see Minister Morse's report) show the effeminacy and deficient longevity of the Italian irrigators. The irrigating Moors were expelled from Spain by the hardy mountaineers of the Iberian peninsular. In America less than a thousand Spanish buccaneers conquered the multitudinous subjects of Montezuma, who depended on irrigation for subsistence. In Peru, where irrigation was the only means of existence, a handful of Spanish pirates conquered the inhabitants and carried off their golden treasures.

In Arizona and New Mexico a prehistoric race, who existed by irrigating the land, have perished from the face of the earth without leaving an enduring monument.

A California paper says that an explosion of certain powder works occured in a town while one railway telegraph operator was telegraphing to another in a neighboring city, and at the instant of the occurence he telegraphed the news ; 60 seconds after the news was received the second operator heard the report of the explosion.

THE COMING MOTIVE POWER.

Is Compressed Air Destined to Become the Rival of Electricity?

Many and marvelous are the inventions which have grown out of electrical discoveries and research until it seems from their multiplicity and present state of perfection that the spirit of invention which animated these creations, must soon slumber. Mighty indeed has been the revolution in the affairs of man wrought by electricity, under the command of genius, even though its march has been in the wake of that other potent force in civilization—steam. Notwithstanding these achievements, the commercial and industrial world is fast becoming conscious of the fact, that its future rapid strides and ultimate commercial supremacy, as a motive power will depend on cheapening the production of this form of energy, so as to oust steam, which feeds wastefully on costly coal. If this problem remains much longer unsolved, its toiling in the field of transportation and in the workshop will be shared by some other of nature's forces, for investors have begun to seriously realize that the millions which have been expended for franchises, dynamos, copper wire, etc., are not fruitful in dividends. It is stated that only 20 per cent of the electric lighting stations in the United States are paying four and a half per cent. Is it the uneconomical process of generating electricity by the initial power, steam, that is responsible for seventy-four electrical railroads, representing a billion and a half of dollars, being now in the hands of receivers? It is true that dynamos in their present state of development give out a high percentage of the engine's power imparted to them and though we find the latter supplying in mechanical energy only ten per cent of that represented by the furnace heat—yet this wasteful process is not directly chargeable to the engine's incapacity to transform power delivered to it, but the trouble is due to the inability of the boiler to absorb and convert the major portion of the heat energy liberated in its fire box. These significant facts have already influenced the recent course of electrical investments and now the selection of a cheap initial power for generating electricity is the all important question of the day. Eminent engineers and scientists are at work upon this problem, some endeavoring to produce electricity direct from coal or chemicals by rapid decomposition, or other methods of electro-chemistry, with a view of locating power plants in the coal fields or by the sea and telegraphing the currents so derived to the cities for consumption, while others are seeking sources of energy to be found in water powers or in the fitful but giant forces of nature, as tides and winds—and the promise recently given that Niagara would soon be a captured Pegasus and harnessed, so as to become a useful wheel-horse instead of a prancing, plunging steed, is now fulfilled.

This development of power in the bosom of nature, many miles distant from industrial centres presents other problems, requiring skill of the highest order, in their solution, namely: the economical transmission and distribution of currents of great magnitude and intense energy over long distances. When large accumulations of electric current are concentrated and prescribed to flow over a conducting wire, it becomes elusive and intractable as it flows forth, and rather than follow the pathway appointed for it to travel, it wastes itself, or passes to other substances and is dissipated so rapidly, that if it is transmitted any great distance the loss becomes so great as to render its transmission impracticable. Thus it can be seen that while electricity has not yet succeeded to its estate the solution of these problems will mark a new era in the history of this subtle element. The applications of electric energy to industrial and commercial uses are so numerous and varied, and this singular phenomenon has received so much attention at the hands of the scientist, the engineer and the capitalist, that the world has become facinated by its conquests, till now the impression prevails that electricity must necessarily become the motive power of the age. The writer does not claim that this, the above tendency, is a false one, but simply is set forth to show the reasons why other available forces in nature have received so little attention and consideration. Among these neglected forces, compressed air may be mentioned, as a means of power transmission that has not received the attention it deserves.

EARLY ATTEMPTS TO USE IT.

The application of compressed air to industrial purposes, dates from the close of the last century, although before this, we find isolated attempts were made to apply it in a variety of ways.

To the fertile brain of Dr. Papin, of France, we are indebted for the first suggestion of conveying parcels in a tube by compressed air, and he was the first to suggest the use of compressed air as a means of transmitting power. This distinguished Frenchman went to the expense of putting his ideas into wood and metal, but the results of his experiments were not encouraging. This was about A. D. 1700.

About a hundred years later, a Welch engineer contrived an apparatus to utilize a water power to work a blast furnace and machinery, a mile and a half distant, by compressed air, but the resulting blast was feeble.

For a century or more water elevators operating by compressed air have been used in the mines at Chemnitz in Hungary. Vague descriptions of apparatus for using compressed air in the mechanical arts are found in early English patents and publications, but none, so far as known, were practically applied. In 1810, Medhurst, of England, patented means for conveying parcels by compressed air. There is no authentic record that his project was reduced to practice and it stands simply as a mile post on the road towards the advancement of knowledge in this direction. In 1824 Vallance revived the idea of Medhurst. Contributions to this science were also made by such pioneers as Pinkus, Clegg and Pilbrow.

In 1837, the Italian government ordered experiments to establish the laws that govern air transmission, and improvements in methods and appliances have followed, resulting in the practical use of air for tunnelling, in conveying parcels in tubes, and that valuable adjunct to railway trains—the air brake.

Along about 1857 an American, Dr. Gorrie, exhibited in London and elsewhere cold producing machines, in which air was compressed in one cylinder, cooled whilst compressed, and re-expanded in another cylinder, in a manner to utilize its expansive force. In 1859, a company was formed in London, and permanent pipes laid down for conveying parcels by air: these lines of pipe were extended in 1865. During the same year Ericsson operated eighty sewing machines by compressed air, in a factory in New York.

Experimental sections of pneumatic dispatch tube for carrying passengers were built at Sydenham, England, and in New York in 1867. The line at Sydenham was 600 yards long, and was traversed in fifty seconds with a pressure of two and one half ounces per square inch. In 1872 congress appropriated $15,000 for a pneumatic dispatch tube between the capitol and the government printing office in this city.

Other systems have been multiplied by telegraph and express companies in Vienna and Berlin. The Western Union Telegraph Company conveys messages from lower Broadway to Twenty-third street in New York, a distance of about three miles. They employ a vacuum, and the parcel travels between the terminals ordinarily in five minutes. Air was used for rock drilling in tunnelling Mt. Cenis, Hoosac, Arlburg and other mountains. In 1879 air was used to propel cars on the Second Avenue Railroad, in New York. This was briefly the state of the art up to 1880, but the dreams of Papin and the hopes of Medhurst were but partially realized. The disappointments of the past are, however, no cause for apprehension of the final successful application of air for transmitting power. Many of the grandest successes of the present were absolute failures in the early attempts. Previous to 1880 the waste of energy in the compression of air, and the sickly design and faulty construction of mechanism for using air, due largely to the ignorance of the principles of thermodynamics, retarded the introduction of air as a mode of transmitting power. At Mt. Cenis tunnel, the loss in compression was fully ninety per cent. In the modern compressors the loss is less than sixteen per cent.

While compressed air has been used over and over again in a small way, and generally in a rough and uneconomical fashion, it was not until within a few years that any systematic attempt has been made to transmit and distribute this form of power for general consumption. Today this is being successfully done in Paris and Birmingham, England, where the installations have given birth to applications and utilizations for purposes heretofore unthought of, with valuable economic results, and a realization of high efficiency in its workings.

In Paris the power is distributed not only to factories and electric lighting stations, but also finds domestic use, being sold to householders, restaurant keepers, etc., keeping them supplied with an available power which is turned to account in many useful ways, in producing the conveniences and comforts of life, while proving a welcome substitute for steam power, with its heat, smoke, danger and waste.

The commercial advantages derived from these air systems have resulted in their rapid extension, and in Paris elaborate provision is being made to increase the size of the plant with a view of supplying an aggregate of 25,000 horse-power.

THE POWER YIELDED.

The general efficiency of this mode of transmitting power in these two systems is conservativly put at from 80 to 85 per cent, a showing that puts to flight the idea that the transmission of compressed air over a distance of several miles necessarily entails enormous losses. The attainment of this efficiency is gained by the help of another physical agent, in connection with the observance of certain simple laws, and an explanation in regard thereto may be readily understood without wading too deep into the water of science; and when understood will make clear the reasons why heretofore the progress in the introduction of a power so rich in possibilities has been impeded, while the truth becomes apparent that there is very little loss of power through its transmission if properly manipulated. In order that the reader may understand the elements involved in the solution of this problem it is necessary to gain a few preliminary ideas as to the behavior of air under prescribed conditions. Air under compression when impelled to move in a certain path is governed by laws quite different from those affecting electricity. As the air flows through the pipes the resistance of the surface of the same has to be overcome, and whenever compressed air meets resistance the pressure falls slightly, but this moderate reduction in pressure does not involve a loss in transmission because what the air loses in pressure it gains in volume, so that its mechanical effect may at any point be easily restored to its initial capacity by the application of a small amount of heat, and it has been found that by this simple expedient its capacity to do work at the points of consumption many miles from the power station is enhanced with but a nominal cost, and that no more economical effect of the application of heat has ever been found than this method of annihilating the effects due to friction in the air's transmission. An eminent English engineer declares that a quarter of a pound of coke per hour per indicated horse power is sufficient to heat the air required in a moderate sized engine.

Nor does this fairly illustrate its economic value, when we come to consider that it is capable of another important service (as alluded to in Dr. Gorrie's discovery) at the points of consumption, in the use of the by-product, the exhaust from the motors—for the purposes of ventilation and refrigeration. In Paris the restaurants and beer cellars are supplied with refrigerant in this manner and which proves highly satisfactory in every respect and displaces the ice melting method, altogether and in some cases is so sought after for cold storage that power is consumed essentially for its exhaust to use to this end.

In this country compressed air is being pressed into service in small ways in every branch of industry but the use to which the public is most familiar is probably in its application to railway trains in its adaptation to applying the brakes; but its uitility and operation in this connection is scarcely appreciated until we come to consider the conditions of its use. While we have all noticed that trains can not be gotten under way until the locomotive has run some distance, to work up speed, it is doubtful if we have ever stopped to think of the tremendous momentum that is being piled up as that speed increases and the energy that must be destroyed in bringing a train to a sudden stop, after it has gotten under way. It is estimated that the vast amount of energy that must be called into action at a moment's notice is greater than can be imparted to a projectile by the largest of modern guns. Its triumph in this direction is daily evidenced and is the one important factor that has made speed in railway travel reconcilable with safety. How few of us have realized the importance of this daily preformance. A train running forty miles an hour traverses 59 feet in each second—lurking danger appears in sight—the loss of one second through the lack of vigilence on the part of the engineer means its hastening on an errand of destruction, by just 59 feet. By the touch of a lever the brakes are applied and the train that was rushing along at almost lightning speed is brought to a standstill in a minimum of time and within a distance of 400 feet from where the danger was sighted, and this prodigious power that is brought to bear on the brakes is so ingeniously distributed and applied as to relieve the cars of all strain, while the train is promptly arrested in its flight without creating any commmotion among the passengers or giving rise to disagreeable shock.

JOSEPH W. BUELL.

A Sioux Falls, S. Dak., subscriber writes that the packing houses of that city are receiving from the ranges of South and North Dakota, Montana, Idaho and Wyoming over 2,000 head of stock daily. Market for the products of these packing houses is found in eastern cities via. Duluth and the Lakes. Sioux Falls is a railroad center, having eight lines and possesses all advantages for a manufacturing center. The northwestern states prefer homemade goods and offer encouragement to home industries. Manufacturers and investors will find Sioux Falls a promising location.

Elihu Thompson is working on a horseless carriage. Gas engine is to furnish the power.

Manufacturers and Inventors.

A committee consisting of Francis H. Richards, Charles E. Billings, Hartford, Conn.; George Otis Draper, Hopedale, Mass.; Lewis Miller, Akron, Ohio; and John C. Cushman, Chicago, Ill., appointed to present the claims and set forth the objects of the American Association of Inventors and Manufacturers, has prepared and sent out the following circular:

In a broad way, the interests of manufacturers and inventors as regards patents, are the same, are coordinate. Manufactures are created by invention, which, in turn, is fostered by the manufacturing industries. The prosperity of the one must needs go hand in hand with the progress of the other.

These coordinate interests are of enormous magnitude, and dominate the progress of the world. It is therefore most fitting that these two numerous and influential classes of our people, whose greater interests run parallel, should join hands in one National Association, and work together for the benefit of all.

The American Association of Inventors and Manufacturers has been formed to promote those common interests by securing the active co-operation of inventors and manufacturers in the collection and dissemination of the best information and opinion on the development, protection and management of inventions and patent property.

For this purpose, the association maintains a central office, in the national capital, in charge of an efficient secretary; and besides the regular officers, has standing committees to whom are intrusted the more important subjects within the scope of the association's work

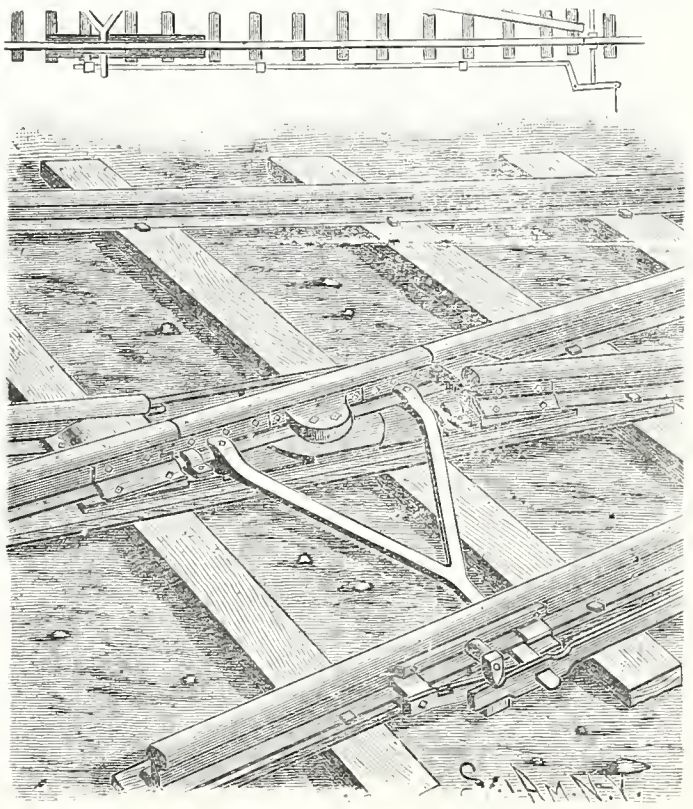
One of the most important of these committees is the committee on legislation, which looks after numerous bills before congress, appears before the congressional committees whenever required, and, through reports and other papers, keeps the members advised of the progress of legislation. The importance of this work will be appreciated when it is remembered that no less than fifty-three files relating to patents were before the last congress, and that many of these bills were inimical to the rights of inventors and owners of patents, while some of them strike at the very root of the patent system itself.

The association publishes, and furnishes free to its members, valuable papers on subjects relating to the nature and protection of property in inventions and patents, and holds annual meetings for the presentation of papers and the consideration of questions relating to those and allied subjects.

It is confidently believed that in no other way can inventors and manufacturers so well serve their best interests as by becoming members of this association and thus directly cooperating in the valuable work it is already doing.

Baird's Improved Railroad Frog.

This improvement has proved to be all the inventor claimed for his patent. Locomotives and cars pass over smoothly, without jar or hurt to either wheels or frog. This frog once placed lasts as long as the rails themselves, therefore saving the expense of renewing and repairing which has to be done so often with the jointed frog. The many accidents which are now chargeable to the use of the ordinary frog with its sharp joints and guard rails, etc., will be things of the past when the Baird frog is adopted by all railroads as there is no place for a man to get his foot fast, nor does it require any attention to fill up or clean out at any time. Railroad men who have the Baird frog in their charge are delighted with it on account of its simplicity, exactness and durability, being the best protected part of the road always in gauge and order. The inventor is now prepared to supply railroad companies with his patent frog at a very low figure, or he will sell the right to manufacture same to parties who may prefer doing their own work. Prices on application. James Baird, Chignecto Mines, Nova Scotia.

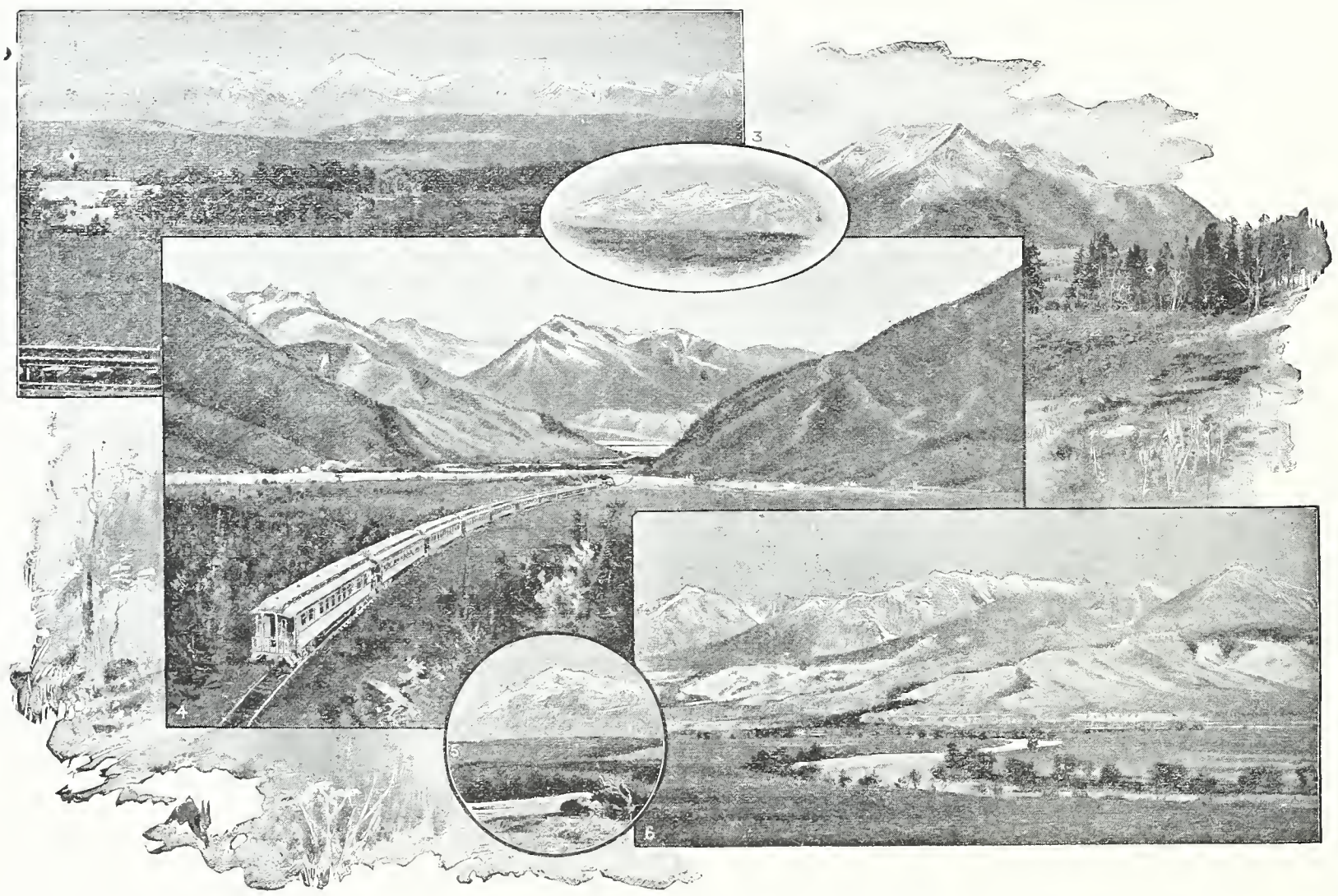


China's Sunken Ships.

The ships sunk in the China-Japanese war are being examined by divers, to see whether they are worth salvage. One of the first victims was the Chinese transport Kow Shing, fired upon by a Japanese war ship for carrying troops, although she flew the British flag. The divers who have been down to the wreck report her in a terrible condition. She is literally torn to pieces by shot and shell.

Mining for Wood.

Mining for wood is a novel industry, and yet it is carried on to a considerable extent in one of the Chinese provinces. A former pine forest became buried by some seismic disturbance and is now about forty feet below the ground. Some of the trees in this buried forest are three feet in diameter, and they are dug up by the natives and used for making coffins and similar articles. The wood from these trees is practically indestructible.



MOUNTAIN SCENERY ALONG THE LINE OF THE NORTHERN PACIFIC RAILROAD.

What they say of the "Inventive Age."

Lockport, N. J.— * * * Please never stop my paper, for on of the last number I have received one dollar's worth of benefit. C. D. O.

* * *

Howell, Mich.— * * * I am well pleased with your paper; am an inventor and have had some experience with patent sharks. Of course my experience cost me $20.00 but I'll know better next time. Had I been taking your paper when negotiations were being made with these sharks I would have known better. L. C. P.

* * *

Wapinitia, Ore.— * * * The Age is the best inventors' paper I know of, and I think it would save a good deal of time and money and not a little worry for ordinary inventors who are taking their first lessons in the business, if they would read it understandingly and thereby prepare themselves to some extent to make a success of what they have undertaken or are about to undertake. WM. A. MILLER.

* * *

Meade, Mich.— * * * I believe advertising the only way to sell patents as I have had much correspondence since I subscribed for and advertised in the Age. W. C. C.

* * *

Pittsburg, Pa.— * * * Please continue my subscription to your indispensible monthly. I will be sure to continue a life subscriber. F. A.

Prof. Goodman, of the Yorkshire College in England, while conducting a series of tests with a 100-ton testing machine, and while testing a steel wire rope, stated that such ropes were not in reality of modern invention and that he had recently seen a bronze wire rope one-half inch in diameter, and from 20 to 30 feet long, which had been found in the ruins of Pompeii, and which must have been at least 1,900 years old.

Horseless Carriages.

Mr. Payson Burleigh, in the Age of Steel, contributes the following advice to inventors on the subject of horseless carriages: When the desirable, as well as the necessary, points about the self-moving road carriage come to be carefully considered, it is found that there must be a way provided to steer it, which will not call for any more effort than is required to guide a gentle horse. If this thing is going to be widely popular, and this seems to be assured—it must be so easily managed that a lady can take it and go out for an airing, with no more anxiety and no more trepidation about steering it, than she feels in handling the reins.

Under the very best conditions, the driver will have to keep a closer watch than in driving a horse, because when a horse is used, the business of guiding the vehicle is divided between two intelligences, that of the man and of the beast, and when he is well trained, a good deal of it is left to the intelligence of the animal.

It will be sometime before the inanimate carriage receives the training which will allow it to be driven with a loose rein anywhere except on a tramway.

The horse follows the crooks of a country road, but the training of the "motorcycle" (horrid name), will inevitably straighten out the crooks in the country road, and afford long ranges of straight tracks. A horse never blindly runs plump into another vehicle in the city streets. A mere touch of the rein, simply as a suggestion, is sometimes given, but a well trained horse is often more capable of guiding himself than the best driver is capable of directing his course. In a dark night on a dangerous road—like some of those which skirt the sides of Californian mountains where a misstep means a headlong plunge over a precipice—the human intelligence perceives that impertinence is too risky, and allows the noble steed to go as he will.

When one takes out a self-propeller for a spin on the road, however, he has to find not only all the intelligence for the direction of his conrse. but also, all the power needed to keep it, or to change it. It may seem, at the first glance, that very little power is needed for this purpose, but a little reflection will show that there must be a constant expenditure of force, even to keep a straight course, because the resistance to one wheel is scarcely ever just equal to the reistance against the other, and just so much as it is greater that much must be borne by some other power. If a stone or a depth of sand, or anything else, obstructs the passage of one of the guiding wheels, there is a tendency to push that wheel back—or something equivalent to that—and this tendency must be overcome, or the vehicle will deviate from its course.

If the course is to be directed by the fore wheels, and these are hung—as ordinarily on common wagons—on an axle that is pivoted centrally, it will require considerable force to turn this axle and the wider the carriage is the greater force will it require.

An ordinary wheel-barrow turns on one wheel very easily; the action is facilitated by tipping the wheel in the direction in which the turn is to be made. The tipping of the wheel to the right, if that is the direction taken, makes part of the turn on the circumference of the wheel; as a top, if it is laid down on its side and revolved, describes a circle of which its point may be the center. So in bicycle riding. But in a four wheeled rig, if it is to be swung on the center of one of the rear wheels, the other rear wheel describes a circle with a radius equal to the length of the axle, or a diameter twice the track of the wagon, the front wheels describe two circles the radii of which differ by the length of the axle and the diameter as due to the distance apart and length of the axles.

It is evident that no vehicle which is propelled by any other than its leading wheels, can, when in motion, allow the front and rear wheels to stand at such an angle in relation to each other as to cause an excess of side thrust on the front wheels, and therefore, no vehicle can be turned as short nor as easy, as one in which the leading wheels are the motive wheels.

In devising new machinery there is always a likelihood of complicating it to a greater extent than is necessary. It is the simple machine which demands genius to preside at its creation. A great deal of complication arises from misconception. Difficulties are amply and elaborately provided for. which in practice, it is found need not have been considered at all, as experience proves they are not usual, or are not serious. Objections must at first, however, be met, whether they are real or fanciful, and it is proved, in every inventor's experience, that bugbears are the most terrific of all affrighting spectres. These circumstances cause first machines to be marvelously complex. When self-binding reapers were first driven into the harvest field, the great array of gears, eccentrics, and contortionary devices made such a portentious appearance that one might have supposed the famous Strausburg clock had been set on wheels and taken out on exhibition, or that it was a vision of the dragon of the Apocalypse, but now these machines have been so simplified that at a little distance, they appear, waving their wands in the air, like helpful fairies gathering grain by magic.

But in the early days of the locomotive, Stephenson was as right as a trivet when he answered an objector who inquired what would happen if a cow got on the track—It was "bad for the coo," then, and it is bad for her now. There are some difficulties which will always exist, because they are inherent in the nature of things.

It is plainly to be seen that the particular feature in the road carriage, the automotor, which is to be considered with the greatest attention, is the steering. The starting, moving, and stopping, are simple matters, although the best point of application of power remains to be decided, but the steering is the unusual part, the process or operation not lighted by much experience. Boat steering, ship steering, does not illuminate it to any great extent, although Sickles' steering by steam power is suggestive. The steering must be made easy, even if it has to be complicated with the driving apparatus, so that the power necessary to move the steering apparatus may come from the same source, and act, when the pilot's will is expressed in the easiest and most delicate manner; as, for instance, by the movement of a lever which swings as lightly as the needle in the mariner's compass. Whether the plan of double swiveling the front axle, making a joint at each of the spindles, affords advantages which will compensate for the extra weight and expense incurred to secure strength, is a question which must be decided in the future by knowledge which experience has yet to obtain.

And forget not the importance of the brake.

Volcanoes in the Aleutian Islands.

The revenue cutter Commodore Perry brings to San Francisco the news that about twenty out of the forty volcanoes in the chain of the Aleutian Islands are now active after it had been supposed for many years that all but one of them were extinct. The exception was Bogaslov Island, which some years ago was found in a state of eruption, and another island was formed by the material vomited up from beneath the waters. Now the two islands have become one, a neck of volcanic material having been forced up to connect them. While the cutter was in the neighborhood the rising smoke and steam from the twenty volcanoes was visible from a distance of many miles, the view changing to as many pillars of fire after dark, the airy columns then "taking on the reflections of the fires that are deep in the earth beneath the craters."

The Aleutian Islands belong to the United States, and on them are probably the only now active volcanoes situated within American territory. It is considered probable that ages ago men may have crossed from Asia to America by way of the Bering Strait. which at its narrowest point is now only thirty-eight miles wide and intersected by three islands, while it is frozen over in winter. It would be strange, indeed, if the result of these eruptions should be the making of a land connection between the two continents, so that the journey from one to the other could be performed on foot over a pathway formerly marked out by points in the Aleutian chain. But that would not be a big alteration in comparison with some which geological investigation shows to have been accomplished by the forces of nature in the long buried past.

The World's Transportation.

Dr. Chauncey M. Depew recently gave a graphic presentation of the land and water traffic of the world last year, from which we take the following paragraph:

"The whole of the tonage on the oceans of the world last year was about 140,000,000 tons, while the tonnage of the railways of the world, carried 100 miles, was about 1,400,000,000 tons. There are 400,000 miles of railroad in the world, of which 180,000 are in the United States. Of the 1,400,000,000 tons carried 100 miles last year on the railways of the world, 800,000,000 tons were carried on the railways of the United States. You take the 600,000,000 tons carried 100 miles on the railways of the world outside of the United States, and then you add to it 140,000,000 carried on the ocean in the commerce of the world upon the seas, and we still have in the 800,000,000 tons carried on the railways of the United States 6,000,000 tons more than on all railways of the world outside of the United States and in all the ocean commerce of the world put together. This internal commerce of the United States makes it the most wonderful market on the globe.

When first taken from mines opals are so tender that they can be picked to pieces with the finger nail.

Important Scientific Discoveries.

Dr. Linde, the inventor of the ammonia freezing machine, now reduces the temperature of the atmosphere to about 100 deg. absolute. by a well thought out system of compressing. cooling. and subsequently expanding. To make clear to our untechnical readers what is meant by this. we will give the following example: Take 10 cubic feet of air and compress it to one tenth its bulk: all the heat which is contained in these 10 cubic feet will be contained in one-tenth of the space. If now this one cubic foot of compressed air be allowed to cool to the temperature which surrounds it, and is suddenly allowed to expand to its former bulk, it instantly calls upon the surrounding atmosphere or whatever it may come in contact with. for all the heat which it has lost while in its compressed condition. We may therefore say that it produces cold. Professor Dewar showed oxygen and nitrogen of which the air is formed in the proportion of about five parts of nitrogen to one part of oxygen, possessed different boiling points, and will separate from each other at the boiling point of nitrogen; this is about 360 deg. below the freezing point of water. At this temperature the nitrogen evaporates and leaves its companion behind in the form of liquid oxygen. Applying this principle of Dewar's, Dr. Linde, taking advantage of the cooling properties of expansion. expects to be able to manufacture and sell 1,000 cubic feet of oxygen gas for about 1s. 2d. In the present state of applied sciences one can hardly venture to predict what result this extraordinary discovery will have upon the world. It is safe to say however, that the discovery is one of the most important which has yet been made, and its use will daily increase. The use of oxygen as a healing agent has already been demonstrated. If liquid oxygen can be so easily produced, it follows that liquid nitrogen can also be made. Nitrogen acts simply as a dilutant to the atmosphere, and under ordinary circumstances is inert. In combination however, with other elements it becomes the basis of nearly all of our higher explosives.

With these two elements added to our commercial resources a wide vista is opened before us for the future application of the most plentiful elements in the world. It is not unlikely that this force will be applied to driving our engines, and put to the same uses to which gas has already been applied in the gas engine, and more lately to superheated steam in the Pinckney motor. It is a most fascinating subject for the dreamer, these scientific possibilities of the future, but the wildest dreams of the most imaginative sentimentalist, are steadily being realized by the efforts of hard working scientists in their laboratories with calcium carbide and the easy production of acetylene gas for our luminants; liquefied oxygen expanded into its natural gas by the simple release of pressure by liquid nitrogen, and the possibilities of some use for argon, one need have no fear that the driving force of the world will fall one whit short of the demand. Another feature added to this already brilliant array of scientific facts may be regarded with the greatest comfort, that the production of these mighty agents and their utilization in the arts and manufactures, is attended with no inherent loss of the elements themselves. No sooner have they been won from their natural combinations and put to practical commercial use, than immediately upon their liberation they resume their normal condition in new combinations of life and growth. The oxygen, the carbon, the nitrogen, all take their places again in the great laboratory of nature, and sustain animal as well as vegetable life. The balance is in no wise disturbed, but simply new utilizations of well-known forces are made.—*Invention.*

Test of Storage Battery Cars in New York City.

A preliminary test of a storage battery car equipped with chloride accumulators by the Electric Storage Battery Company, of Philadelphia, was made recently on the Madison avenue horse railway line in New York city. The new car has a longer wheel base than the horse cars now in use, and the chief objcet of this test was to discover what changes would have to be made in certain curves on the line. It was found that some of the sharp curves will have to be modified. It is expected that final tests of the newly equipped cars will be made within three or four weeks. After that a number of cars will be placed in regular service to run during the winter.

War is recognized as one of the great evils which have always scourged the world. but in most cases it seems to carry with it some good. By the terms of the peace agreement between Japan and China, the latter country will hereafter be open to the introduction of all forms of modern machinery, and admitted free of duty. Within a few years China may see that her defeat was a blessing in disguise.

Important Inventions.

Mr. F. W. G. Boettcher, of West Duluth, Minn., is the inventor and patentee of a number of important and useful devices. Recently he was granted, through his attorneys, Messrs. Mason, Fenwick and Lawrence, of Washington, D. C., a patent for a display apparatus for store windows, and which also can be constructed on a smaller scale and be used as a toy. This apparatus consists of a suitable supporting base on which is mounted a revolving platform for displaying goods. Life sized wax figures are also arranged on the revolving platform and have rotary and vertical dance movements independent of the platform. A comical automaton is made to grasp the handle of an organ, and appears to be grinding out music for the dancing dolls, by the same mechanism which operates the other parts of the apparatus. The apparatus when placed in a store window is operated by the same electric motor

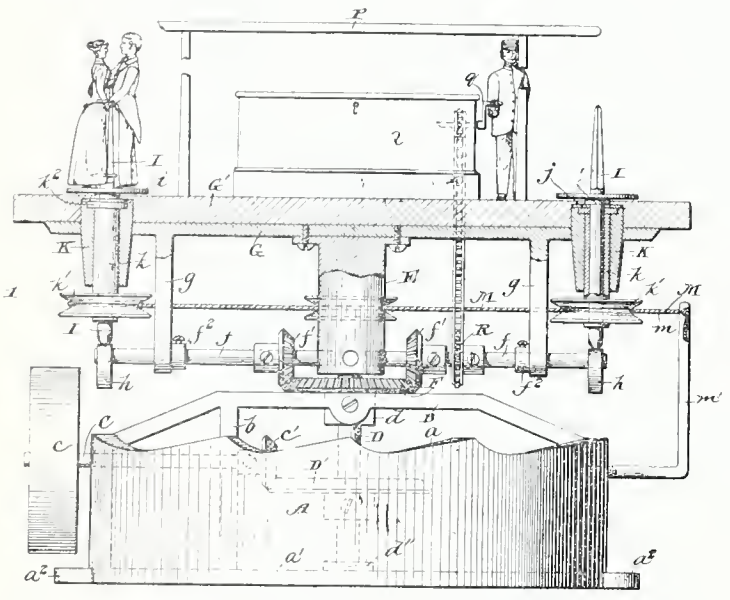
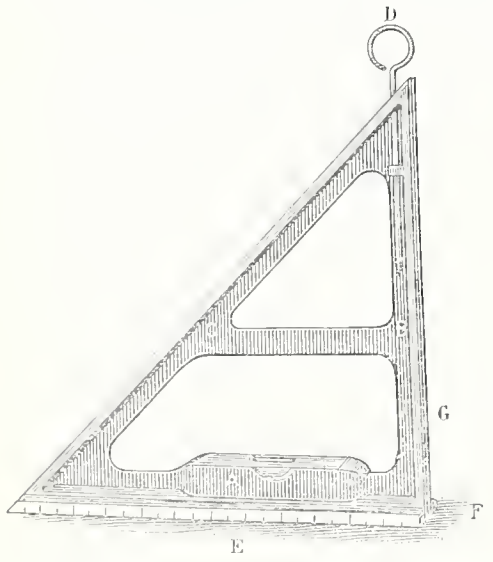


Fig. 1

or other power which operates the store service or other apparatus; and it, in addition to displaying goods, attracts a great deal of attention. The apparatus can be made on a much smaller scale as a toy, and be operated by hand power.

Another patent granted to Mr. Boettcher's is for a combined square, level and triangle, and the same is illustrated below. This tool is designed for the use of carpenters, mechanics, and builders, and uniquely combines in one implement, a square, level and triangle, each of which is perfect in construction and operation, and one can be used without interfering with the other. This tool has met with approval wherever introduced, and it can be manufactured at a small cost and sold at a large profit. An investment of a little capital would make this invention a commercial success. Mr. Boettcher has also applied for patents for improvements on his



display apparatus and on a whistle or alarm for bicycles and doors: and also as a sounding toy for children; and he has also applied for a patent on a heating and cooking system for dwellings. This last invention is designed to heat an entire house with one-third the fuel, and is so constructed and arranged that the house is protected from fire. Provision is also made for a bake oven which can be moved nearer to or further away from the fire and thus made to regulate the heat in the oven. The apparatus is also supplied with a perfect damper and draft system for regulating the heat in any part of the building.

Any information concerning these patents obtained by addressing Mr. F. W. G. Boettcher, West Duluth, Minn.

A subscriber writes from Tabor, Ia., enclosing $1.00 for another year and remarks that he considers the INVENTIVE AGE of "great value to the inventor" and that it "contains valuable information not obtainable elsewhere." Another subscriber in Peoria, Ill., says, "your want column has served me well. It placed me in communication with parties who took an interst in my inventions."

Gray's Invention for Sawing Quartered Oak.

One of the most valuable improvements in the art of lumber manufacturing that has appeared in the Patent Office of late years is that invented by George W. Gray of the lumber firm of Gray & Gatchell of Leliaton, Ga.

By the use of this mill 40 per cent in the cost of turning out quartered-oak is saved. The mechanism consists of a longitudinally double saw-table provided with oppositely driven saws. The log is first quartered, and then one quarter is placed on the table, and fed to one saw, and after having had a board sawed off is rolled over to the opposite side of the table and sent back to the end of the table from which it started, taking off a second board. Thus two boards are produced during every trip of a log and there is no idle movement of the log backward as in the old mills commonly used. Two quarters can be sawed at one time, one going forward while the other is coming backward. Rolling weights hold the quarters in place, while spiked-rollers carry them past the saw. It is estimated that if Mr. Gray could get ten per cent of the cost of time and labor saved in this mill, his fortune would be made in a very short time. Mr. Gray experienced a long and vexatious delay in securing his patent by falling into the hands of a pension agent who was running a patent bureau as a side issue.

Mr. Gray says that all the pension agent did was to call for fees; and receive rejection after rejection of the application through incompetency. He finally secured the services of Mr. R. G. DuBois of Washington, and revoked the power of the pension agent.

As a result, he received a broad patent which appeared in last month's issue of Patent Office Gazette Mr. Gray has a full-sized mill running at his place in Leliaton, Ga., and it has been pronounced by lumbermen to be one of thy greatest improvements in saw-mills which has been made in years.

Great Gas, Ascetylene.

A small company interested in the matter, were invited by Rev. J. H. James to witness the first application of the new gas, ascetylene, to the stereopticou, at the Methodist Church Monday evening. The experiment proved that the new illuminant is splendidly adapted for this use.

The apparatus in which to hold and from which to use the gas on this application was of the joint construction and design of Rev. Mr. James and George N. Phelps of Vernon. It consisted of a copper receiver, with an appartment in the base in which the gas is generated, the volume being controlled by the automatic flow of water in an upper apartment, giving a gas pressure of about one pound. The apparatus is very simple and easily managed.

Ascetylene gas is made by the decomposition of water by caroide of calcium, a substance made by fusing coal dust and lime in an electric furnace. The flame from ascetylene gas is much cooler than that from illuminating gas, while the illuminating power is about twelve to one. The incandescent light appears like a red hot hairpin beside this new light. Even the light of the Welsbach burner is no whiter. There is no flicker nor change of color.

When carbide of calcium comes to be more cheaply produced it is estimated that the cost of the new light will be not far from twenty-five cents a thousand feet, though the possibilities of the new gas can not now be easily estimated It may be used as a an enricher of common gas.

The new apparatus was very successfully tried at Mr. James' lecture in Coventry last evening. It is likely to work a revolution in the methods used for lighting stereopticons, because of the expense of transportation and the danger involved in the use of the oxide calcium light.—*Rockville Journal.*

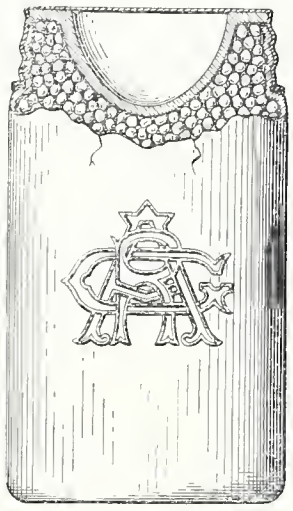
The durability of wet timber is something remarkable. Recently, according to a Vienna paper, one of the piles supporting the bridge built across the Danube by the Emperor Trajan, was taken up. Although driven seventeen centuries ago, it showed no change, save that it was petrified to the depth of three-quarters of an inch. The chestnut, beach, elm and oak piles on which stand the Savoy Palace, London, are undecayed. They were put in place in the latter part of the thirteenth century.

Rapid Telegraphy.

Patrick B. Delaney, a New York telegraph operator and electrician, is the inventor of a system whereby it is possible to send 1,714 words a minute over a single wire. This was easily accomplished in a recent test at Columbia college. The strength of the current used was only a little over 100 volts. With a greater voltage Mr. Delaney claims that messages could be sent at even a greater speed and for any length of time. Many in the audience wondered how it was possible to make one wire do so much, but when the lecturer showed that the message had first to be placed on a continuous tape, in which holes were punctured, so many holes representing one letter and so many another, the matter became simpler. One wire in this system can, it is claimed, carry messages as fast as fifty or more perforator operators can get them ready for the transmitter. The speed accomplished was at the rate of 1,714 words a minute. The lecturer calculated that even estimating 800 words a minute 32,914 messages of seventy-five words each could be sent from New York to Chicago in a day.

The Gilchrist Patent Fruit and Food Preserving Jar.

A favorable mention of the Gilchrist Fruit and Food Preserving Jar appeared in the July issue of the INVENTIEE AGE. Since that date these jars have been generally put upon the market in Washington and elsewhere and the universal verdict is that it is the "ne plus ultra" invention in the jar line. At the Atlanta exposition it attracted more than ordinary attention. A cut and more specific description of the jar is given herewith for the information of capitalists and dealers in this class of goods with whom the inventor desires to communicate with a view of disposing of rights for states west of the Mississippi. This invention is fully protected by good patents in this and foreign countries. The jar is perfectly air tight and positively prevents fermentation and the formation of mold on the top of the fruit or food packed in the same. This jar, wherever introduced, is rapidly supplanting all other forms



of glass jars now on the market, and is what housekeepers have been looking for for years. It will be seen from the cut, that the metal cover is constructed with a cone shape porcelain lining, having an annular space between it and the screw threads of the cap, said lining extending down below the screw-threaded cover a short distance, so that when the cover is placed on the jar and is being screwed down, the lower end of the cone lining will come in contact with the fruit or food, and cause the same to rise into the space above mentioned and thereby expel all the air that may be in the jar and at the same time hermetically seal the jar against the entrance of air.

For further particulars address R. A. Gilchrist 39 Hanover St., Wilkes-Barre, Pa.

A Lost Caisson.

At the time of building the bridge of Nag-el-Hamad, over one of the innumerable branches of the Nile, half-way between Alexandria and Cairo, a caisson which had been sunk to a depth of 35 feet suddenly veered, as if shaking and tossing on the ocean, and turning on one side, completely sunk into an impenetrable quicksand, the existance of which was unknown to the engineers. Forty laborers, mostly Fellahs, were in the caisson. Although efforts were made for locating and rescuing the unfortunate imprisoned natives immediately after the accident, no trace of the huge caisson could be found. The soundings made showed traces of brick at a depth of 45 feet, and the theory is advaneed that some old masonry laid over impassable quicksand thousands of years ago gave way under the enormous weight of the caisson.—*Power and Transmission.*

SUPPLEMENT.--Tips to Inventors.

The Infancy of Invention.

As capital is constantly being invested and expended to protect and preserve capital previously expended and invested in various enterprises all over the land, so will inventions continue—their variety and multiplicity being demanded to further the usefulness and perfection of inventions previously originated.

It was Edison who, replying to the question, "Do you think that the inventions of the next fifty years will be equal to those of the last?" said: "I see no reason why they should not. It seems to me that we are at the beginning of inventions." The truth of this prediction is illustrated in the many useful and wonderful achievements of Mr. Edison's own laboratory since giving utterance to this statement only a short time ago.

Profits from Invention.

The value of an invention is determined by no fixed rule. Fabulous sums have been made from simple and novel, as well as complex and useful, inventions. It is a fact that four-fifths of the business of the United States is transacted by the use of inventions. The benefits to mankind because of inventions, are so manifest and so common we are apt to look upon them in a matter-of-fact sort of way and fail to give the inventor the credit due him. In the majority of cases, however, the failure of an inventor to reap a reward is attributable to his own negligence, lack of forethought and indiscretion.

Nearly every human being is an inventor, but only a few obtain a *monopoly*—a patent—on the product of their brain. There are thousands of really useful articles, appliances and discoveries, in use every day by millions in all walks of life, that might have been patented had the inventor possessed the business sagacity that has actuated his more fortunate neighbor. Take for instance the open slot necessarily used in all conduit electric, or cable street railway systems. The inventor failed to get a patent on the idea and a fortune missed him.

There is money in inventions, but not always for the inventor.

The only way to make money out of an invention is through the protection afforded by a patent; not a patent in name only, but a *good patent*—one that is intelligently drawn, with claims commensurate with the scope and importance of the invention.

The profits arising from inventions in the electric field during the past twelve years have been simply astounding. In railway appliances, bicycles, typewriters, telephones, cash registers, slot machines and farm machinery, the field has been equally remunerative. And just think of that simple toy "Pigs in the Clover"—it netted the inventor, whose friends laughed at him for obtaining a patent on so simple a toy, over $150,000. The inventor of the metal plates to be attached to the worn heels of shoes (for sale in all cities) realized a fortune out of it amounting, it is said, to nearly $1,000,000. Perforated wooden seats for chairs and rubber tips for lead pencils brought the inventors big results. Howe made a million dollars from his sewing machine attachments, and the inventor of that simple lamp attachment, the inverted glass bell, to be suspended over lamps to protect the ceilings from being blackened, made the inventor rich. The "Darning Weaver," a device for repairing stockings, is a useful invention and is netting the inventor a handsome revenue on royalties. The wire nail and gimlet-pointed screw are fortune makers, and wire nails caused the invention of automatic machinery that manufacturers them so cheaply it does not now pay the carpenter to spend his time in picking a nail up when it drops, if it requires ten seconds to do so. The inventor of the well-known "safety pin" lived in luxury all his life, after discovering a means of concealing the point of a pin in such manner as to prevent scratching. The inventor of roller skates made nearly a million and the inventor of the needle-threader for a long time made $10,000 a year.

Relation of Capital to Invention.

Mr. Edward P. Thompson, one of the most entertaining writers on the subject of invention, says that "every invention, before the introduction into practical use, passes through two stages; namely, mental and physical"—mental when in the mind of the inventor only, and physical when the mental invention is put into bodily form by hand, or by hand with the assistance of a convenient tool. "A mental invention," says the writer, "sometimes does not become a physical invention because the inventor lacks money, technical knowledge or diligence. Such a mental invention often becomes a physical invention by the assistance of a capitalist, an educated person, or diligent companion." This being true the *mental* inventor, the person who, for lack of means possibly, would fail to make his invention a physical reality—such a person should take into his confidence a friend or companion to share the prospective benefits of his invention. Thousands of meritorious mental inventions are never worked out because of the over-timidity of the inventor, his exagerated greed for *all* the benefits to accrue instead of half the loaf, which in many instances is, or would have been, ample reward. Mr. Thompson truly says: "Inventors and capitalists should be more willing to co-operate. It is too often the case that the former must pay for his own experiments and all patent costs before a capitalist will even take the trouble to look into the merits of the alleged invention. On the other hand it is too often true that the capitalist seeks to join with the inventor, but the latter wants too high a price at the beginning."

Who Can Apply for Patents.

Patents are issued to any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or new and useful improvement thereof, not known or used by others in this country, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned; and by any person who, by his own industry, genius, efforts and expense has invented and produced any new and original design for a manufacture; any new and original design for the printing of fabrics; any new and original impression, ornament, pattern, print or picture to be printed, painted, cast, or otherwise placed on or marked into any article of manufacture, or any new, useful and original shape or configuration of any article of manufacture, the same not having been known or used by others before his invention or production thereof, nor patented or described in any printed publication, upon payment of the fees required by law and other due proceedings had.

If it appears that the inventor, at the time of making his application, believed himself to be the first inventor or discoverer, a patent will not be refused on account of the invention or discovery, or any part thereof, having been known or used in any foreign country before his invention or discovery thereof, if it had not been before patented or described in any printed publication.

Joint inventors are entitled to a joint patent; neither can claim one separately. Independent inventors of distinct and independent improvements in the same machine can not obtain a joint patent for their separate inventions; nor does the fact that one furnishes the capital and another makes the invention entitle them to make application as joint inventors, but in such case they may become joint patentees. The receipt of letters patent from a foreign government will not prevent the inventor from obtaining a patent in the United States, unless the invention shall have been introduced into public use in the United States more than two years prior to the application. But every patent granted for an invention which has been previously patented by the same inventor in a foreign country will be so limited as to expire at the same time with the foreign patent, or, if there be more than one, at the same time with the one having the shortest unexpired term, but in no case will it be in force more than seventeen years.

Protection to Inventors.

What is a patent? It is a monopoly or grant, in the United States, for a term of seventeen years, to the patentee, his heirs or assigns, of the exclusive right to make, use and vend the discovery throughout the United States, as the inventor's rights may appear in the specifications and patent granted.

This means a great deal to the inventor who has secured a *valid* patent containing all the claims so worded as to prevent infringement and loss in contest. Thousands of inventors, obtaining patents through unreliable and inefficient attorneys or agents, find themselves possessed of patents *in name only*, and of no value when combatted by infringers with capital and the aid of able legal talent. A good patent costs no more than a weak and worthless one. Therefore how shortsighted are those inventors who employ cheap attorneys, saving $5 or $10 in fees, only to find themselves loosers of *all* they have paid when the contest comes.

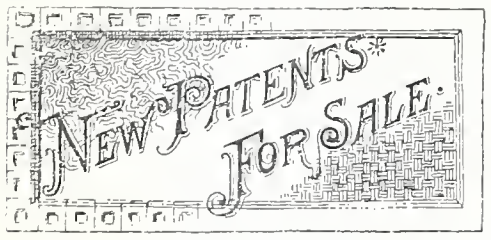
The Need of Reliable Attorneys.

The Revised Statutes of the United States provide that "before any inventor shall receive a patent for his invention, he shall make application therefor in writing to the Commissioner of Patents, and shall file in the Patent Office a written description * * * of the same in such full, clear, concise and exact terms, as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct and use the same; and in case of a machine, he shall explain the principle thereof and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions."

To carry out these provisions it is necessary for the inventor to first make a clear, concise and complete drawing, or a working model of his invention or discovery, and send it to THE INVENTIVE AGE, or some thoroughly reliable attorney, who, before making application for the patent, should make a thorough and rigid examination of the Patent Office to determine upon its novelty or patentability. If the invention has been anticipated by some one else, or if it lacks novelty, or if for any reason a patent can not be granted, or, if granted, would be of no worth or value, then the inventor does not want to incur the expense of making application and paying attorney's fees and government fees. For making this thorough examination THE INVENTIVE AGE and all reliable attorneys charge $5, which fee is, under some circumstances, however, taken out of the additional fees paid by the inventor in case letters patent are applied for. The fees of patent attorneys vary somewhat, but the average fees for obtaining a United States patent are about $65—the government fees being $15 on filing the application and $20 on issuing a patent—the balance being the fees for preparing specifications, making searches, etc. The inventor is sometimes favored in terms given for payment of the fees, more detailed information regarding which can be obtained by enclosing a 2-cent stamp with enquiry to THE INVENTIVE AGE, Washington, D. C. The reason why the inventor should have a preliminary examination of the Patent Office made before applying for a patent lies in the fact that if the case is rejected the fees paid to the government and the attorney are lost

All patents obtained through us will receive special mention in THE INVENTIVE AGE and in cases of unusual merit inventions will be illustrated free of charge to our clients.

This publication, reaching capitalists, manufacturers and business men throughout the world, is of value in assisting to bring an invention before the public in case its promotion or sale is desired by the patentee.



Advertisements inserted in this column for 20 cents a line (about 7 words) each insertion. Every new subscriber sending $1.00 to THE INVENTIVE AGE will be entitled to the AGE one year and to five lines three times FREE. Additional lines or insertions at regular rates.

FOR SALE.—A combined square, level and triangle; also a Display Apparatus for store windows, using life size dancing figures; for sale outright or by states. No patent selling agent need apply. For particulars address F. W. G. Boettcher, West Duluth, Minn. 12

FOR SALE.—A two-thirds interest of a valuable Canadian Patent, No. 38,240, for an improvement in Thill-Coupling. It is superior to any in use and can be cheaply constructed. Address J. S. McClellan, Cambridge, N. Y. 12-2

FOR SALE.—Half interest in my patents No. 525,039, for the United States and 47,893 for Canada. Collar Button Clasp and Shirt Combined, no collar button in neck band. A very valuable invention. A quick seller with large profits. Full information given on application. Address J. B. Wolgemuth, Mitchell, South Dakota. 8-11

FOR SALE.—My Coin Operated Automatic Newsboy, contains patented device for rejecting spurious coins. Effective. Device costs five cents. Will sell right to use to parties having slot machines not in competition. Address to M. M. Tomblin, Rockford, Ill. 8-11.

FOR SALE.—Patent No. 544,038. Draft Gate for Fire Doors. Will sell outright at a very reasonable price. To manufacture the same will cost only 2 cents a piece. No drilling or filing necessary. Address, H. R. Hoffman, 1004 Central Avenue, Hamilton, Ohio. 9-11

FOR SALE.—Will sell patent No. 522,872. Garden Hoe for $3,000. One person will perform as much labor with the hoe as three persons with other tools. Very easy to work. Blades replaced when worn. J. H. Andre Lockwood, N. Y. 9-11

FOR SALE.—My patent No. 458,052. Hitching Post Attachment. A great improvement over all others, has been thoroughly tested. With good satisfaction, can be attached to wood or stone posts. Copies of patent and specifications sent to any one desiring to investigate a good thing with a view to business. Address, S. B. Hopkins, Council Grove, Kansas 9-11

FOR SALE.—$1,000 will buy the entire U. S. patent to one of the most usefnl garden and field implements. Address, L. R. Fife, Livingston, Polk Co., Texas. 9-11

FOR SALE.—Patent No. 543,206. Gopher-Trap. Entirely new principle, the most successful catcher, simple in construction, inexpensive to manufacture, it sells on sight. Address with stamp. Albert Butzer, Deer Park, Wash. 10-12

FOR SALE.—Patent Hook and Eye. Can be inserted without sewing on the garment. Strong, neat and economical. For particulars, address, Ellen Donnelly, Hempstead, N.Y. 11-1 '96.

FOR SALE.—Patent 542,819, issued July 16, 1895. Self Fastening Saw Clamp, Can be folded so as to be carried in the pocket. Light and durable. For particulars, address, A. T. Binkerd, 126 Robinson st., Allegheny, Pa. 11-11.

FOR SALE.—Patent 544,043. Stove Pipe Joint Cover. Great Seller. Staple Article. No Stove Pipe should be put up without it. Will make royalty offer. Liberal terms. Write to James Woodside, Hawarden, Ia. 12-2

FOR SALE.—A complete set of Patent Office Reports and Official Gazette of the U. S. Patent Office from 1790 to 1894. H. B. Dickinson. Ravenna, O., Adm'r of Estate of Bradford Howland. tf.

FOR SALE.—My Patent, 540,179, issued May 28th, 1895. Improved Combined Step Ladder, Clothes Rack and Ironing Table. Will sell entire interests or State rights. Address the Inventor Josiah C. Mifflin, Du Quoin, Ill. 11-1 '96.

FOR SALE.—All the necessary material for making a small dynamo, finished ready to wind, only $3.50. Send for circulars. W. I. Beecroft, Bangor, Maine. 11-1 '96.

THE INVENTIVE AGE can recommend the "Climax" watch, advertised in another column, as being, undoubtedly, the best stem-winder watch for the price in the market. It is a good time keeper, and either a plain or imitation engraved cases can be had. This watch is fully timed and regulated and fully guaranteed for one year, the same as Waltham or Elgin.

Want a Fountain Pen?

One of the very best in the market, a standard article, warranted, will be sent as a premium with THE INVENTIVE AGE. The retail price of the pen is $2.75. We will sendthe AGE one year and the pen for $2.75.

BUSINESS SPECIALS.

Advertisements under this heading 20 cents a line each insertion—seven words to the line. Parties desiring to purchase valuable patents or wanting to manufacture patented articles will find this a valuable advertising medium.

WANTED.—To Manufacture on Royalty. Or, For Sale Patents Nos. 546,882 and 546,883. Price $6,000. Dr. Gunther. Schorenksville, Pa. 11-11.

WANTED.—The Perfection Sack Tie. The best known agents wanted everywhere. Circulars and prices free, would contract on royalty or sell whole U. S. Patents. Address, J. R. Eichenberger, Patentee, Burton City, Ohio. 9-12

Recent Australian Patents to Americans.

The following list of applications has been specially prepared for the Inventive Age by Mr. George G. Turri, Certificate Patent Agent, Melbourne, Australia :

A. T. Timewell, Chicago, U. S. A. Sack filling and sewing machine.

L. H. Montross, Camden, N. J., U. S. A. & A. Segal, Philadelphia, U. S. A. Match making machine.

J. G. Pohle, New York, U. S. A. Process for elevating liquids.

G. Westinghouse, Jr., Pittsburg, U. S. A. Improvements in buffers and drawbars.

C. F. Goddard, Chicago. U. S. A. Threshing machine.

T. Ewing, Jr., Yonkers, N. Y., (Assignee of J. H. Robertson of Brooklyn) Writing telegraphs.

A. Hoffman & H. W. Falk, both of Milwaukee. U. S. A. Improvements in rail joints, apparatus for and method or process of forming the same.

D. Best, San Leandro, Cal., U. S. A. Traction engines.

H. Small (per agent), Hartford, U. S. A. Driving bits for horses.

W. F. Hutchinson, New York, U. S. A. Match splint machine and for improvements in assembling match splints, also for improvements in stave machines.

S. J. Moore, Toronto, Ontario, Canada Numbering machine (2 patents).

J. C. Wells, East Hampton, U. S. A. Improvements in saddles.

E. D. Bronson, Denver, Col., U. S. A. Methods of and apparatus for placer mining.

E. Maertens, Providence, Rhode Island, U.S. A. Process and apparatus for treating raw wool and similar animal fibres with solvents.

B. C. Hinman, New York, U S. A. Process of and appratus for extracting gold from ore and other auriferous substances.

J. A. Fairbanks, Cambridge, U. S. A. Bell buoys.

B. Baron, New York, U. S. A. Machines for the manufacture of cigarettes.

S. J. Moore, Toronto, Ontario, Canada Manifold salesbooks.

F. H. Long and D. C. Skaden, Chicago, U. S. A. Appliance for recovering precious metals from their ores.

S. W. Wood, New York, U. S. A. Condensing pump adapted to be employed in refrigerating and making ice.

Cantwell & Company, Patent Agents, Calcutta, India.

We have received from this well-known and long established firm in the east their handy little phamphlet which deals fully with the laws and regulations appertaining to the taking out of Patents and registering of Trade Marks in India and other Eastern countries. It will be found a very useful adjunct to the file of Patent Agents in this country and more so to those in this city, the headquarters of the fraternity. The manual contains a list of charges which we think are very moderate, and, which will we feel sure fill a long felt want in that direction.

A junior member and representative of the firm, Mr. Harry Cantwell, is at present in this city which he proposes to make a permanent residence.

All communications to him with reference to any information regarding Patent Practice in the East may be directed in care of the Inventive Age office, Washington. We may add that the above firm are the sole agents for the "Inventive Age" in India, British Burmah and Ceylon.

Excursion Rates to Atlanta.

On account of the Atlanta Exposition, the B. & O. R. R. Co. will sell excursion tickets at greatly reduced rates. Season tickets will be sold every day until December 15th, good returning until January 7, 1896. Twenty-day tickets will be sold every day until December 15th, good returning for twenty days from date of sale. Ten-days tickets will be sold Tuesday and Thursday each week until December 24th, good returning for ten days from date of sale. The rates from Washington will be $26.25 for season, $19.25 for twenty-day, and $14 00 for ten-day tickets.

Correspoudingly low rates from other points on the line.

"BUBIER'S POPULAR ELECTRICIAN" is the name of a monthly publication which contains a vast amount of valuable information on all electrical subjects. Its department of "Questions and Answers" will be appreciated by students and amateurs desiring information or instruction on any problem that may arise. THE INVENTIVE AGE has made special arrangement whereby we can supply that popular dollar journal and THE INVENTIVE AGE—both publications one year—for $1.50.

Aftermath.

The battle field of Bull Run has been sold at auction and will be cut up into small farms.

Suit has been begun by the Carnegie Steel Company against the Maryland Steel Company for infringement of the patent granted to Captain William Jones on metal mixers.

The new battle ship, "Indiana," was formally taken over on the 26th ult. by the Government from her builders, the Cramps of Philadelphia, and taken to the League Island Navy Yard for commission.

The London Labor Gazette contains an article on the wages of the manual labor classes of the United Kingdom, in which he gives the average rate for men at $6.62 per week; women, $3.04; lads $2.14, and girls, $1.52.

A hearing has been had before Judge Dallas, at Philadelphia, in the suit between the Harvey Steel Company and the Bethlehem Iron Company, involving the Harvey armor plate patent. Decision will be rendered soon.

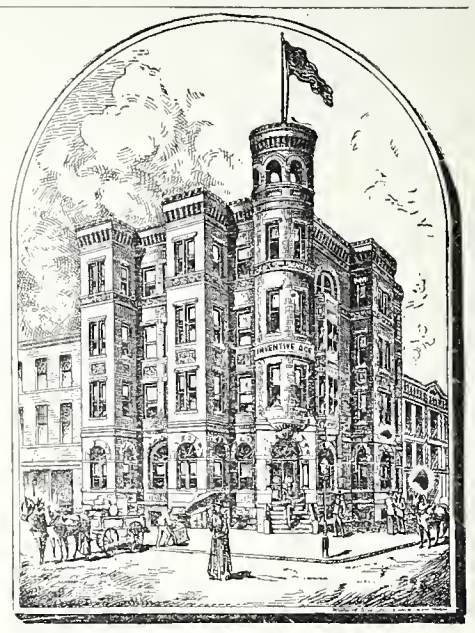
A large paper mill, having double the capacity of any other paper mill in the world, is to be erected with American capital at Sault Ste. Marie. The company, in which the Cramps of Phildaelphia are reported to be the heaviest stockholders, have purchased the water power rights at the falls, on the American side, for $262,000.

The large steel steamer which the Globe Iron Works of Cleveland, Ohio are building for the Mutual Transportation Company of Cleveland, for $275,000, will be the biggest vessel on the lakes, and will command the highest Lloyd's classification on lake or ocean. The vessel is 432 feet long over all, and will carry about 6500 tons. She will be ready for service in the spring.

A great international industrial exposition is to be held at Johannesburg, South Africa, beginning in April next. It is to be arranged in 34 different sections. It is also said that amusements will be provided, and a syndicate of first-class business men will provide side shows for the exhibition. Charles P. de Garmo is the Director-General, whose address is Johannesburg, S. A. R.

The chimney of the new Edison electric plant, at Paterson, N. J., which has just been completed, is one of the most massive structures of its kind in the country. It stands 230 feet in height and has a diameter of 21 feet at the bottom, tapering to 13 feet near the top, which is crowned by an iron cap 16 feet 6 inches in diameter and weighing 6,000 pounds. The chimney is built of brick.

William H. Rau, of Philadelphia, Pa., announces that the half-tone engraving business so long conducted by him has been made the basis for the formation of a stock company entitled the International Engraving and Illustrating Company. He will retain an active interest in the new concern, and all of its work will be done under his personal supervision. The photographic and lantern slide business will be conducted by himself as heretofore at 1324 Chestnut Street.



INVENTIVE AGE BUILDING.

PREMIUMS TO SUBSCRIBERS.

Read the following offers to new subscribers:

OUR $1 OFFER.

THE INVENTIVE AGE one year and two copies of any patent desired, or one copy of any two patents..... $1 00
THE INVENTIVE AGE one year and a list of 50 firms who manufacture and sell patented articles..... 1 00
THE INVENTIVE AGE one year and Altograph map of the City of Washington 1 00
THE INVENTIVE AGE one year and a five line (35 words), advertisement in our "Patents For Sale," or "Want" column, three times..... 1 00

For $1.

THE INVENTIVE AGE and any one of the following Scientific books:
How to Make Electric Batteries at Home, fully illustrated, by Edward Trevert.
Everybody's Handbook of Electricity, illustrated, by Trevert.
How to Make a Dynamo, by Trevert.
Practical Directions for Electric Bell Fitting and Electric Gas Lighting, by Trevert.
Elihu Thompson's What is Electricity?

OUR $1.35 OFFER.

THE INVENTIVE AGE one year and Joseph Allen Minturn's famous book "The Inventor's Friend," indorsed by such high authorities, as Dr. Gatling, Clem Studebaker and others.....$1.35
Book alone 50 cents.
THE INVENTIVE AGE one year and any one of the popular and instructive books as per offer in another column, under heading of "Popular Scientific Books."..... $1.35
THE INVENTIVE AGE one year and a copy of "Picturesque Washington," 260 pp., 136 illustrations, Stilson Hutchins' famous book, former price $2, sent to any address in the United States..... $1 35
THE INVENTIVE AGE one year and The Peoples' Atlas of the World, one of greatest bargains ever heard of; size of Atlas 14 x 22 open; latest maps and statistics; handsomely illustrated, a $2 book with AGE one year—both for.... $1 35
☞ See another column for other offers.

OUR $1.50 OFFER.

THE INVENTIVE AGE one year and Robt. Grimshaw's famous book "Tips to Inventors"..... $1 50

Address all communications to
THE INVENTIVE AGE,
Washington, D. C.

Inadvertantly the credit for the illustrated article on electric welding appearing in the November issue, was not given to Bubier's Popular Electrician, that most interesting of electrical and mechanical papers for the inexperienced student in mechanics and electrcial research. By special arrrangement we are enabled to offer this magzine and the Inventive Age one year, both for $1.50

And What Do You Think of This?

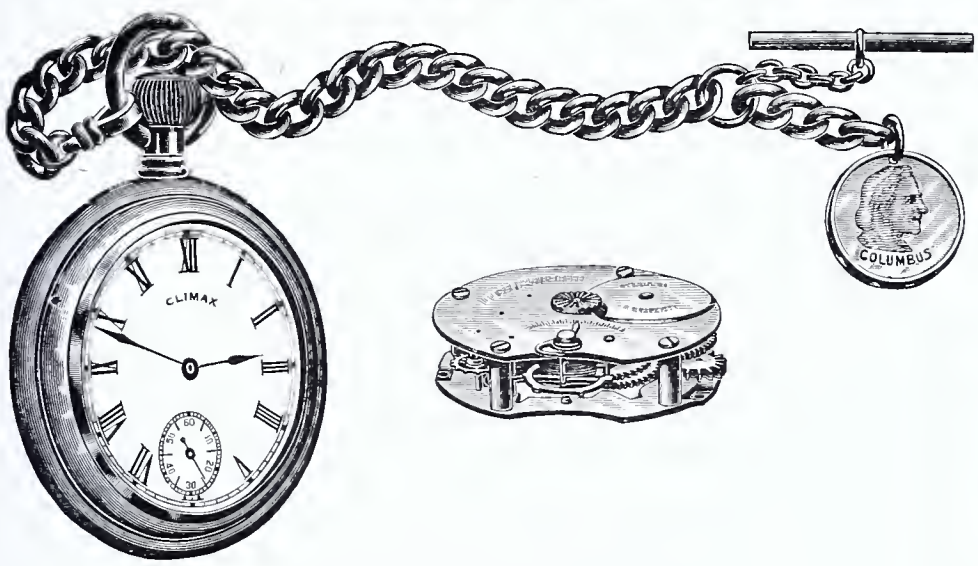
JUST OUT! BRAND NEW! ENTIRELY ORIGINAL!

$2. An American Stem-Winder.

A DUPLICATE IN QUALITY, APPEARANCE SIZE, ETC., OF ANY AMERICAN WATCH SOLD FOR LESS THAN $10.00

Our Watches are Positively and Unequivocally Guaranteed.

THE CLIMAX



EITHER ARABIC OR ROMAN DIAL.

This is the CLIMAX up to date. It represents the most important step taken in Watch evolution in many years. It describes a line beyond which nothing radical will pass for years, not only in the matter of PRICE, but QUALITY. The movement comprises many original patented features, and has been for years the subject of constant labor by one of the foremost of the foremost of expert and inventors.

DESCRIPTION.

CASES.—Two Styles, Plain and Imitation Engraved. Two Finishes, Solid Gilt and Nickel. Two Dials, Roman and Arabic. Snap Back. Heavy Bevel Crystal. Regular Stem Wind. Inside Stem Set. Regular 18 size Case. Chains assorted in each dozen.

MOVEMENT.—Regular American Lever, Lantern Pinion, Quick Train, 240 Beats per Minute Three-quarter Plate, Short Wind, Runs 30 hours to one winding. Dust Cap over Movement.

Fully Timed and Regulated, and FULLY GUARANTEED for one year, the same as Waltham or Elgin.

The Cheapest Stem-Winding Watch Ever Produced.

PRICE $2. With "THE INVENTIVE AGE" one year, $2.50.

JUST PUBLISHED.

How to Build a One-Fourth Horse-Power Motor or Dynamo.

By A. E. WATSON.

Illustrated with full working drawings.

PRICE, PAPER, 25 CTS. CLOTH, 50 CTS.

Address "INVENTIVE AGE," Washington, D. C.

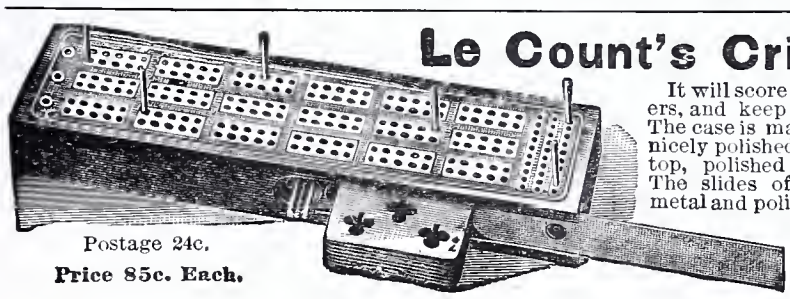
THE STAR FOUNTAIN PEN.

A solid 14 karat gold pen in highly finished hard rubber holder. The only fountain pen that will give perfect satisfaction, sold at less than $2.50. We warrant it in every particular and refund money when it is not satisfactory. A gold pen alone of the same value costs in any retail store more than we charge for the whole outfit. Writes 25 pages fools cap to one filling.

By mail, **$1.50** each; **$12** per dozen.

With "Inventive Age" one year, $2.

Le Count's Cribbage.



It will score for three or six players, and keep tally of the games. The case is made of black walnut, nicely polished; has a solid metal top, polished and nickel plated. The slides of compartments are metal and polished. This Board is superior to Boards that sell for three times the price. Full directions with each Board.

Postage 24c.

Price 85c. Each.

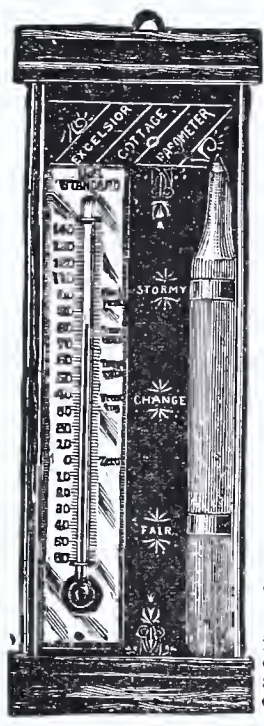
With "Inventive Age" one year, $1.60.

Columbia Engraving Co.

927 F Street, N. W., Washington, D. C.

Photo-Engraving in Half Tone and Line for all Artistic and Mercantile Purposes.

All Work Guaranteed and Shipped When Promised.



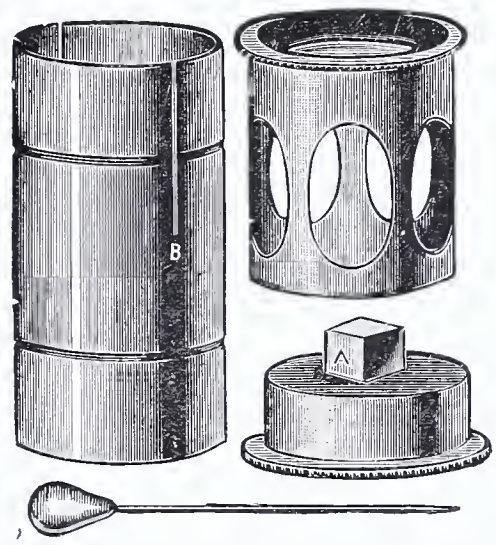
THERMOMETER & BAROMETER COMBINATION.

Combination Barometer and Thermometer.—Our well known leader. Blue and Gilt back with metal side posts. Fancy top and bottom and handsome enough to decorate the home of a millionaire. Extra well made and dependable on for showing changes in both weather and temperature. One of the biggest bargains in our list. A handsome thermometer, together with a glass tube containing a chemical preparation which rises and falls by action of the atmosphere, foretelling correctly all changes in the weather. This is a new style storm glass and the most reliable ever known, being in use in all signal service stations. The slightest change in the atmosphere in some way affects this glass. The thermometer is also of the best quality. Both are enclosed in a stand with walnut top and bottom and blue and gilt back. On either side is also a strong metal bar giving the whole great strength and adding to its appearance. Altogether it is a most remarkable combination for the price and we take pleasure in offering it to our patrons

This is not one of the many cheap combinations of which the market is flooded which are neither good for ornament or use and can never be relied upon to forecast either the weather or in fact any thing else.

There is no reason for you to depend on the weather Bureau reports as every person who owns one of our Combinations, can make his or her forecast and tell exactly when it will be fine, rainy and in fact every change in the weather. With this you can tell whether to put on rubbers and a mackintosh or a pair of summer shoes and a costly dress. Don't take any more chances about the weather but be prepared. Each one packed securely in a neat box so that they can be mailed up without any fear of getting broken or damaged. Postage 10c. **Price 32c. Each; $3.00 Doz.**

With "Inventive Age" one year $1.25.



COMBINATION MICROSCOPE.

Scientific skill and the greatest perfection in workmanship coupled with a very high magnifying power, distinguish this handsome microscope over all others ever offered at popular prices. It is specially imported from France, and readily sells for one dollar at retail. As regards power and convenience of handling, good judges pronounce it the best ever introduced for popular use. The cylindrical case is manufactured from highly polished brass, while there are two separate lenses—one at each end of the microscope. The larger glass is a convex magnifier, adopted for examining insects of various kinds, the surface of the skin, the hair, fur or any small articles. It will magnify the hairs on the hands or arms till they resemble large ropes, and it is a most interesting companion. The other lens is exceedingly powerful, and will clearly delineate every small object, entirely invisible to the naked eye such as the animalcules in a drop of water, fishes, feathers and the minutest insects. An interesting illustration of its great power may be had by placing a drop of sour flour paste upon the bottom of the lens, when on looking through the eye-piece, the sight of the writhing mass of thousands of worms, snakes and eels, is one never to be forgotten. Thousands of living animalcules can be seen in a single drop of stagnant water. An insects eye is a very beautiful object when seen through this microscope. It reveals hundreds of small eyes or six sided facets resembling net work or honeycomb, which enables the insect to see in all directions without moving its head. There are 4,000 of these little eyes in the single eye of a fly. It is invaluable in detecting adulterations in food, such as flour, tea, coffee, sugar, spices, milk and the fatal trichina spiralis or pork worm. Postage 3c. **Price 47c. Each.**

With "Inventive Age" one year, $1.35.

NEW BOOK--JUST OUT.

How to Make and Use the Telephone.

By GEORGE H. CARY, A. M.

Illustrated with working drawings; and gives practical directions for building and operating telephone lines. Just the book for anybody interested in this subject. It is the latest book published, and is up to date.

Contents: CHAP. I. The Telephone. II. The Telephone Line. III. How to make Receivers of Simple Construction. IV. Batteries best suited to Telephone Work. V. Magneto Call Bells. VI. Switch-boards. VII. Telephone Troubles and How to Remedy Them.

PRICE, Postpaid, $1.

Address, THE INVENTIVE AGE, WASHINGTON, D. C.

JUST PUBLISHED.

Dynamo Builders' Hand-Books.

By A. E. WATSON.

No. 1. How to Build a ¼ Horse Power Dynamo or Motor.

No. 2. How to Build a ½ Horse Power Dynamo or Motor.

No. 3. How to Build a 1 Horse Power Dynamo or Motor.

No. 4. How to Build a 1,000 Watt Alternating Current Dynamo or Motor.

Each Book Contains FULL WORKING DRAWINGS and INSTRUCTIONS for BUILDING the DYNAMO or MOTOR.

Price 50cts., Postage Free.

THE INVENTIVE AGE,

Washington, D. C.

GREAT HOLIDAY OFFER!

Valuable
Sensible
Economical

Zell's Condensed Cyclopedia

Always Sold at $6.50 Complete.

Complete in One Volume. A Compendium of Universal Information, Embracing Agriculture, Anatomy, Architecture, Archeology, Astronomy, Banking, Biblical Science, Biography, Botany, Chemistry, Commerce, Conchology, Cosmography, Ethics, The Fine Arts, Geography, Geology, Grammar, Heraldry, History, Hydraulics, Hygiene, Jurisprudence, Legislation, Literature, Logic, Mathematics, Mechanical Arts, Metallurgy, Metaphysics, Mineralogy, Military Science, Mining, Medicine, Natural History, Philosophy, Navigation and Nautical Affairs, Physics, Physiology, Political Economy, Rhetoric, Theology, Zoology, &c.

Brought down to the Year 1890. Substantially Bound in Cloth with the Correct Pronunciation of every Term and Proper name, by L. Colange, LL.D. Handy Book for Quick Reference. Invaluable to the Professional Man, Student, Farmer, Working-Man, Merchant, Mechanic. Indispensable to all.

In this work all subjects are arranged and treated just as words simply are treated in a dictionary--alphabetically, and all capable of subdivision are treated under separate heads; so that instead of one long and wearisome article on a subject being given, it is divided up under various proper heads. Therefore, if you desire any particular point of a subject only, you can turn to it at once, without a long, vexatious, or profitless search. It is a great triumph of literary effort, embracing, in a small compass and for little money, more (we are confident) than was ever before given to the public, and will prove itself an exhaustless source of information, and one of the most appreciated works in every family.

It cannot in any sense--as is the case with most books--be regarded as a luxury, but will be in daily use wherever it is, by old and young, as a means of instruction and increase of useful knowledge.

Thousands of leading men offer the highest testimonials. It is not a cheap work; it is standard.

Never before, even in this age of cheap books, was such a splendid offer made, viz:

$2 For Cyclopedia, Postage Paid.
For Inventive Age, One Year. $2

An Extra Copy of Cyclopedia to any person sending us Six New Subscribers. The Same Offer is made to old Subscribers renewing for another term.

Address THE INVENTIVE AGE, Washington, D. C.